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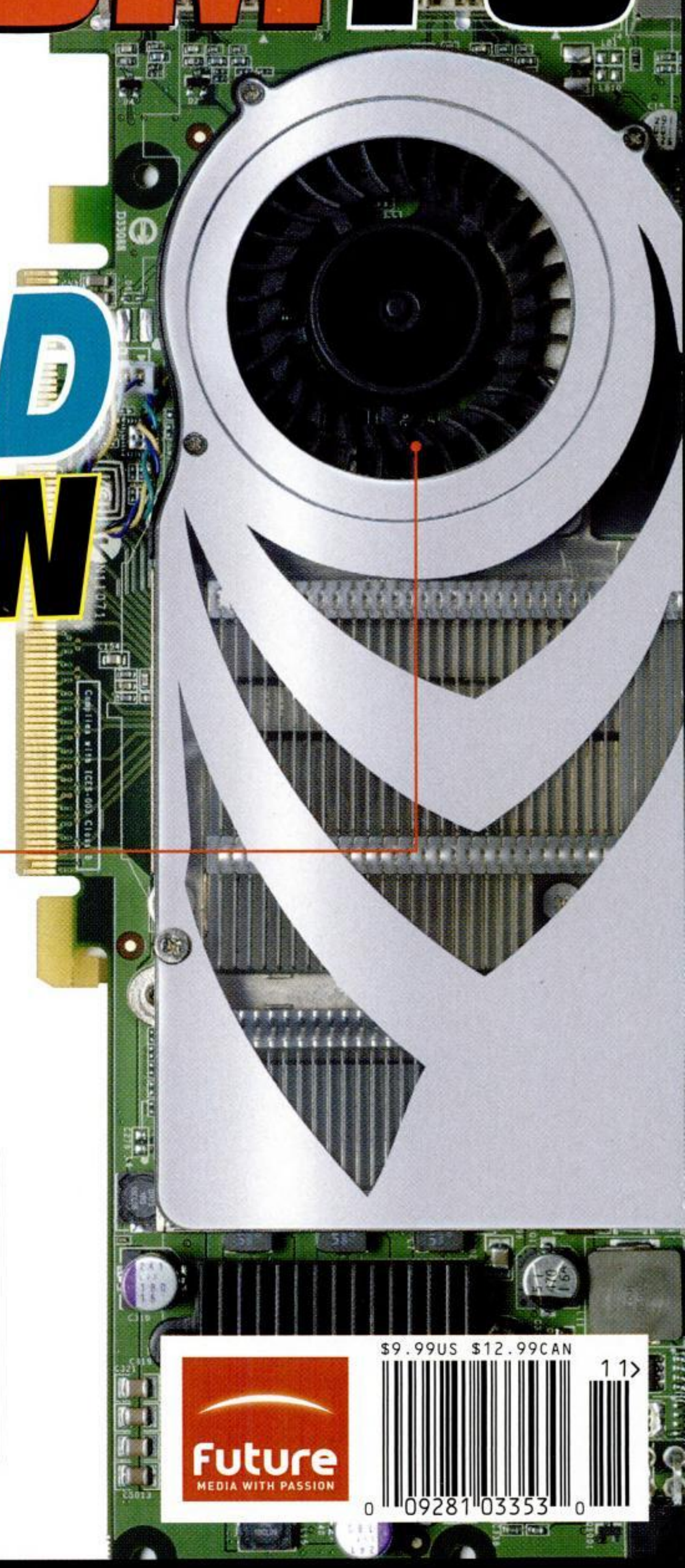

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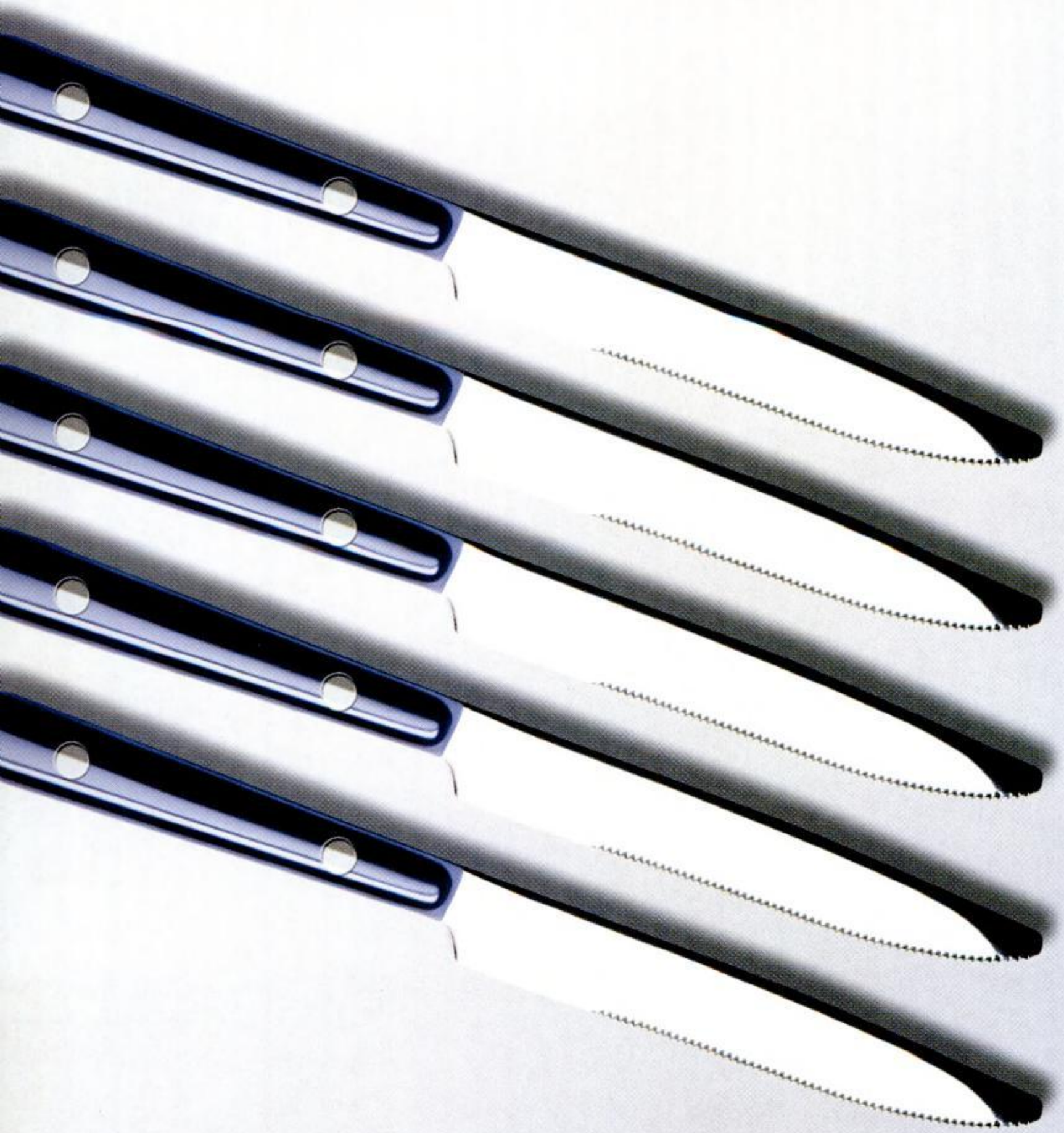

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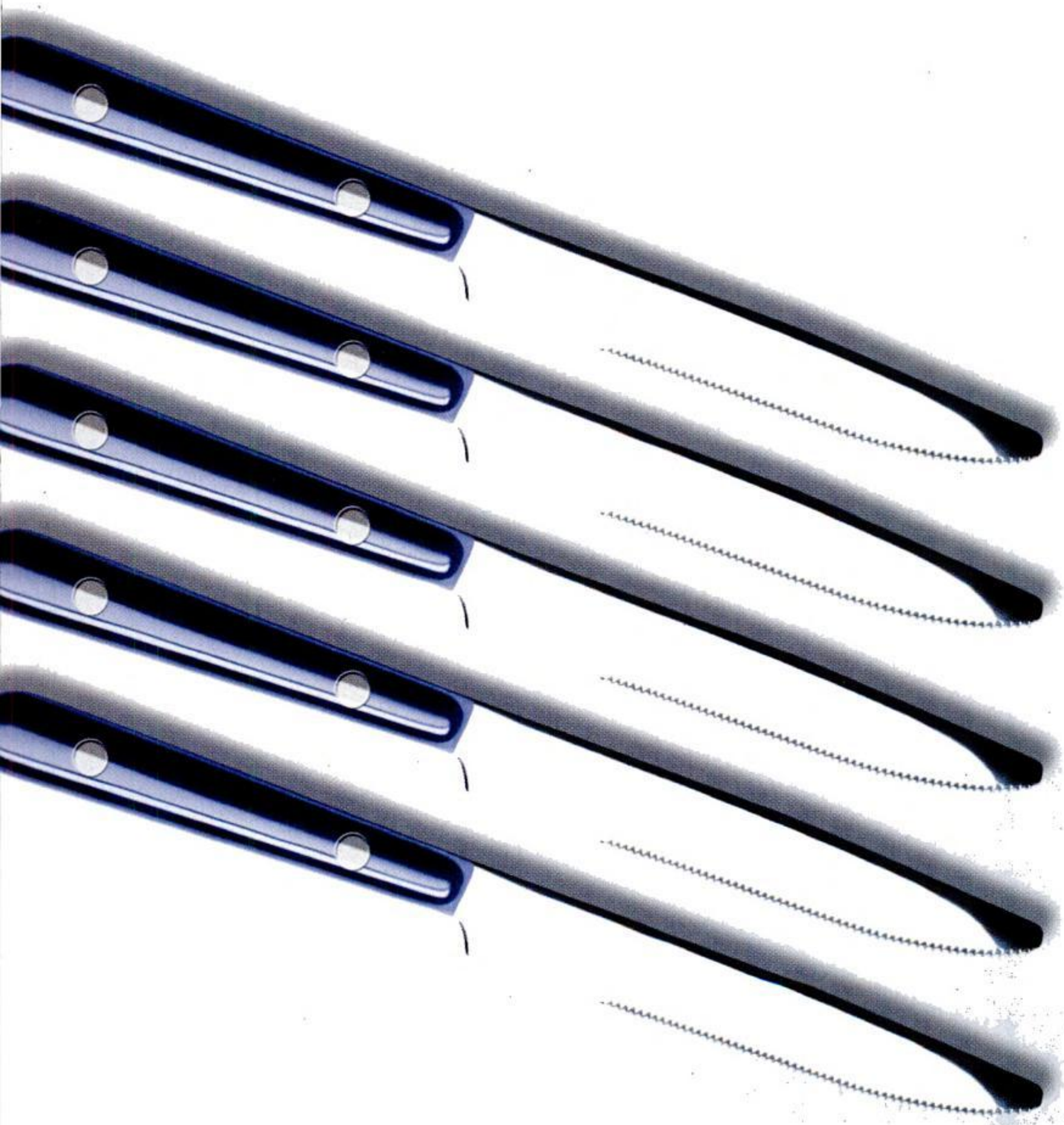

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Ed Word

How Windows Won Me Over

Please send feedback and pie to ***will@maximumpc.com.***

It's still hard for me to believe that Windows has been around for 20 years. I'm not going to pretend I was using Windows during its earliest years. I just didn't see a need to burden my 286-powered "speed machine" with a clunky graphical shell that ran on top of DOS, which I was perfectly comfortable using. Then I bought a new 386—a Wang, in fact—bundled with Windows 3.0. True, it was useless for playing games, it was slow, and it was an unbelievable memory hog, but I could run my spreadsheet and word processor at the same time. Wow.

My true gee-whiz, this-Windows-thing-might-work-out moment didn't happen until I saw *Photoshop 3.0* running on a Pentium-powered Windows 3.1 machine. Not only was I able to scan in photos, I could also manipulate them pixel by pixel. I spent the better part of that first afternoon with Windows 3.1 scanning blurry shots of license plates and trying to sharpen them enough to read the numbers. The ability to manipulate photos is something we take for granted today; digital cameras are plentiful and cheap, image processing software is free, and even the slowest computer can handle photo editing with aplomb. In 1994, it took a state of the art rig—think Pentium 60 with 16MB of RAM—that cost more than $4,000, and a hyper-expensive piece of software to even rudimentarily edit photos.

When I upgraded to Windows 95—10 years ago to the day that I'm writing this—a whole new world opened up. To me, the biggest feature in Windows 95 wasn't the new interface, but native support for TCP/IP. I kissed goodbye the cobbled-together collection of apps and drivers I needed to connect to the Internet in Windows 3.1, and embraced the dialer and WinSock built into Win95. Still, I was frustrated with Windows 95's unstable nature, and the seemingly constant need to reboot the machine.

In 1996, I bought Windows NT 4 and fell in love. It had everything I was looking for: the built-in stability of a native 32-bit kernel, native support for Internet protocols, and the spiffy new Windows 95 interface. Sure, I had to boot to Windows 95 (and later 98) to play games, but once I used NT for the first time, I never went back to a DOS-based operating system again.

When you're reading the "Happy Birthday, Windows" cover story on page 34, check out those screens of Windows 1.0 and 2.0, and just think about what your PC operating system is going to look like in another 20 years.

Will Smith

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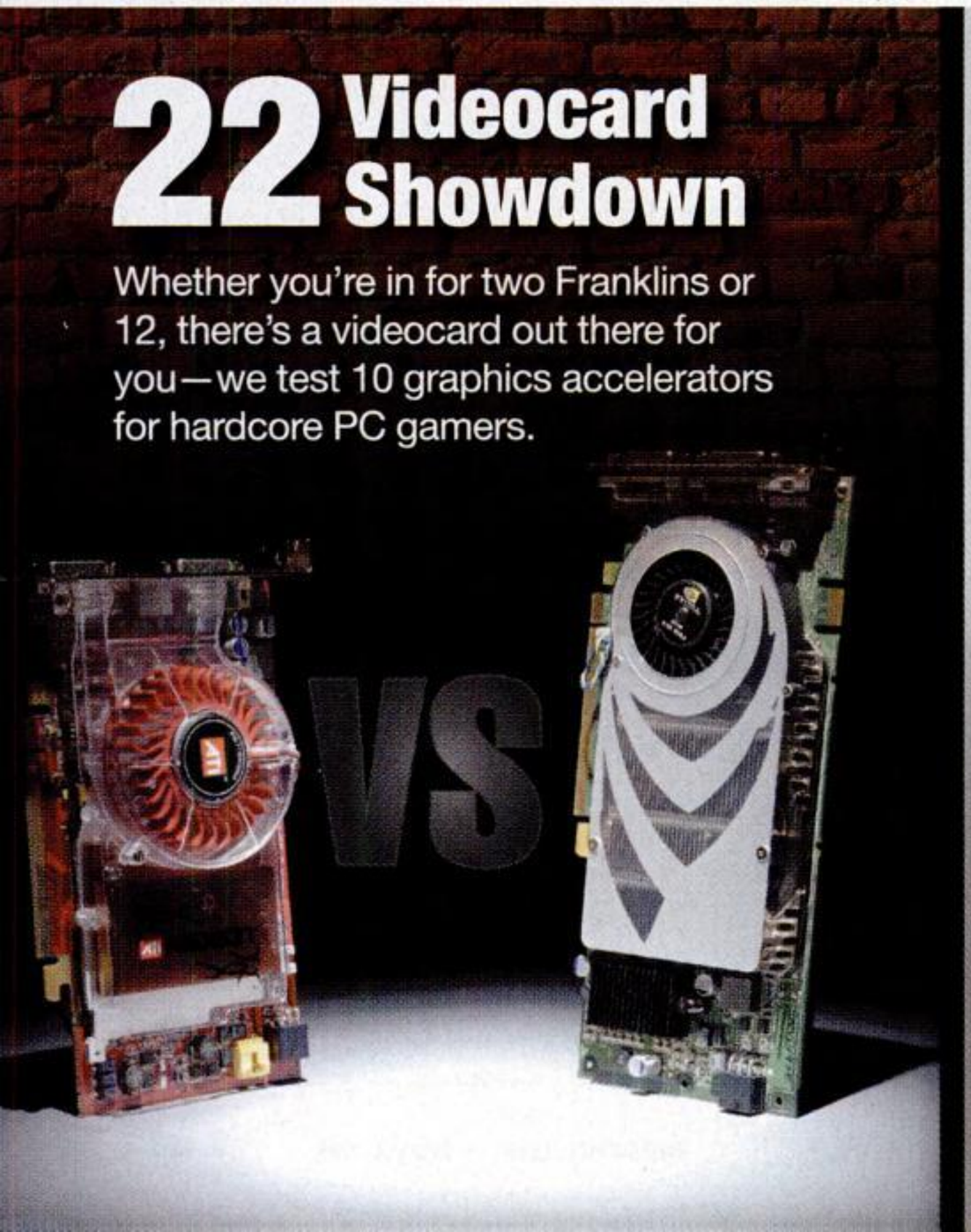

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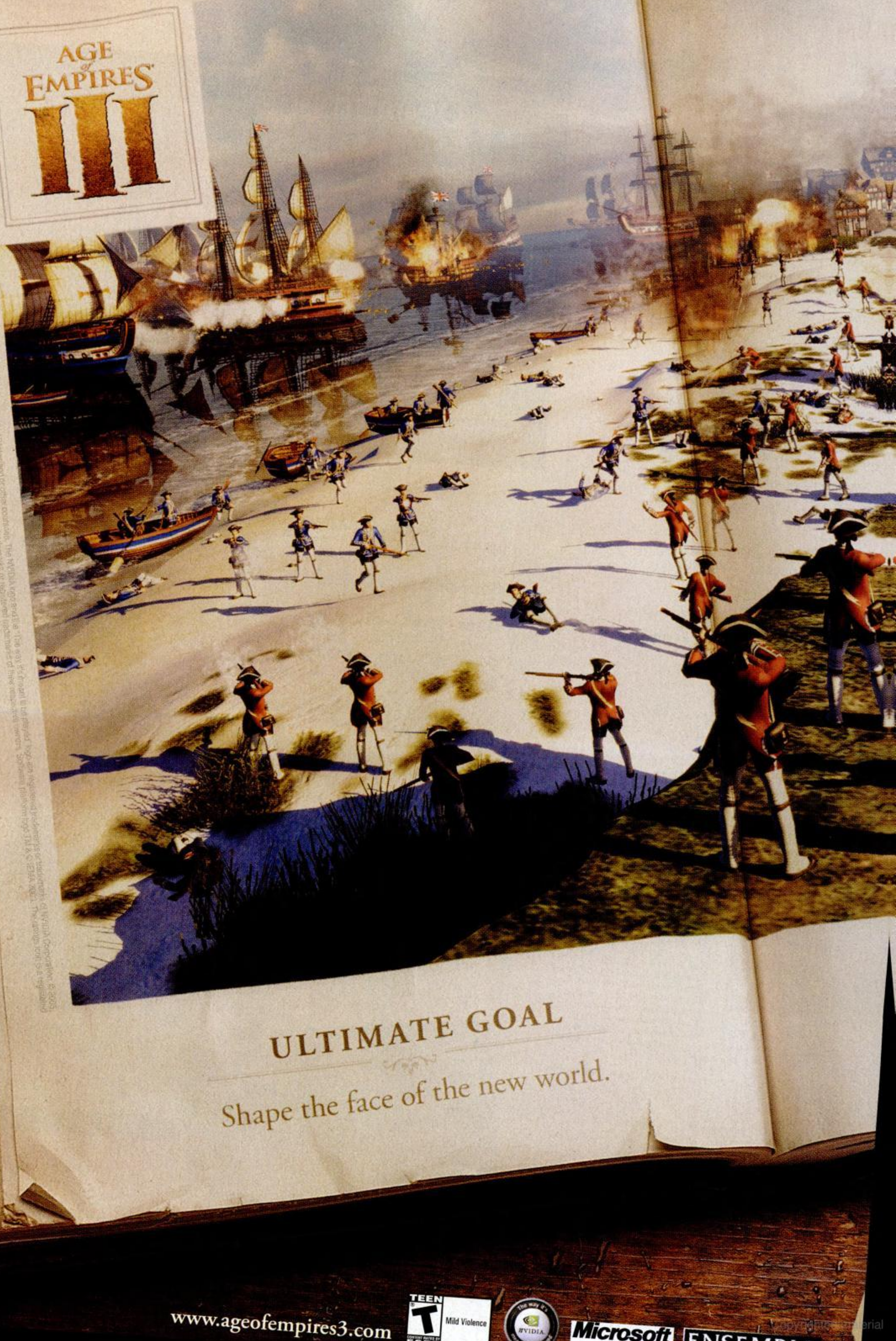

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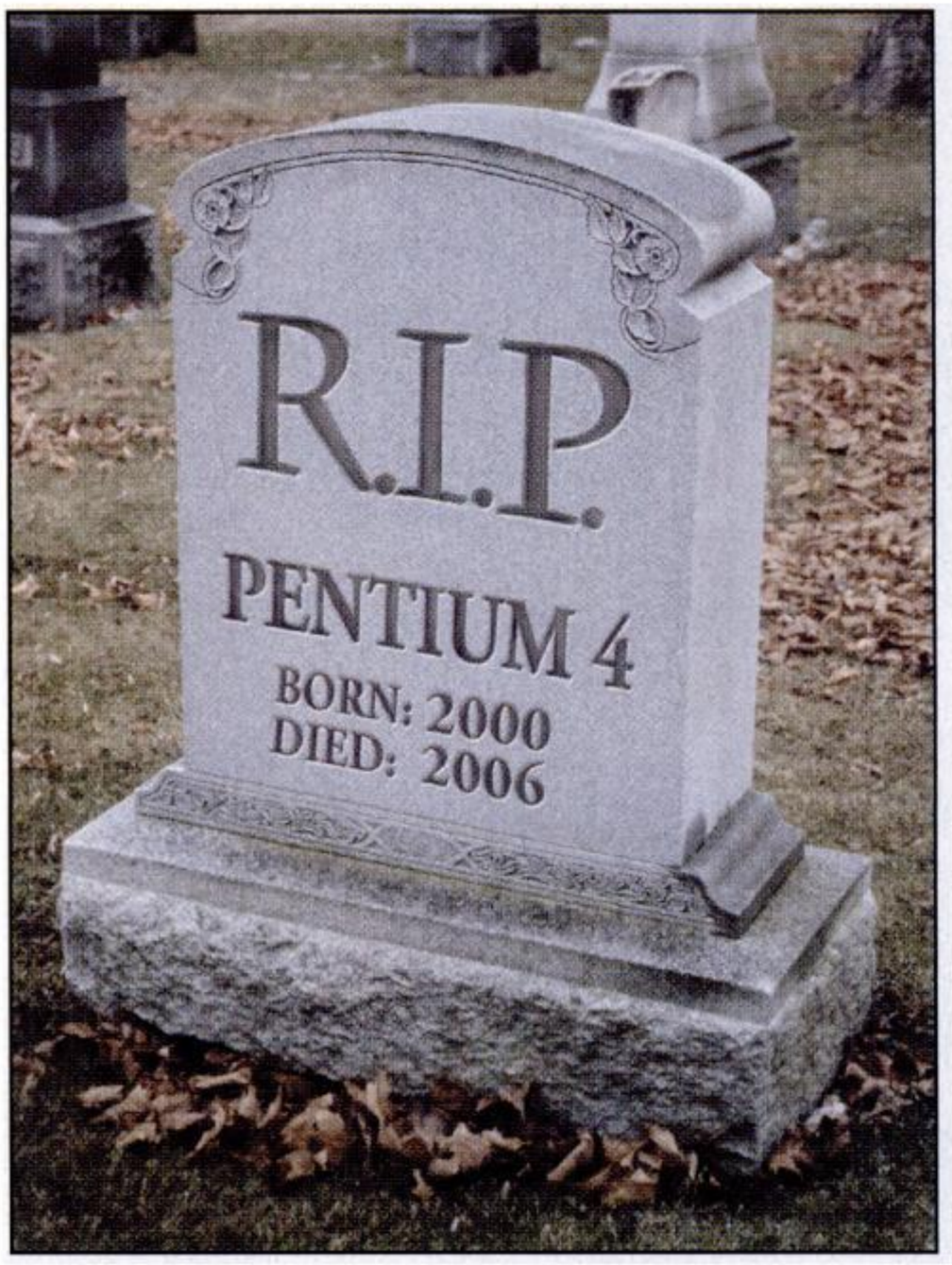
Goodbye, Pentium 4

Intel moves all its processors onto a new, low-wattage micro-architecture that promises a 5x performance increase over the P4



The P4 Prescott's 31-stage pipeline and NetBurst architecture will always be remembered.

Shakespeare himself could have penned the tragic rise and fall of the mighty Pentium 4 processor. In 2000 A.D., with war brewing between Intel and the neighboring kingdom of Athlon, the weakening Pentium III was dethroned by the upstart Pentium 4 and its promise of multi-gigahertz computing. But the Pentium III would have its revenge in the form of its heir: The power-sipping Pentium M core (also known as Banias). Now, five years after the death of the PIII, the reign of the Pentium 4 is coming to an end; Intel has finally outlined broad plans to replace the P4's NetBurst architecture with one far closer to that of the Pentium M.

This "next-generation" micro-architecture will use the CPU code-named Conroe, and will eschew the ultra-high clock speeds (and corresponding excessive heat and power requirements) of the Pentium 4 for a rubric Intel calls "performance per watt."

SO LONG, NETBURST

Does this mean Intel's NetBurst architecture is singing its swan song? Intel officials hemmed and hawed when we asked, but experts were more forthcoming. "NetBurst *is* dead," said Kevin Krewell, editor of *Microprocessor Report*. Krewell said there are certainly processors based on NetBurst coming down the pike, but the architecture is clearly going away. Furthermore, technology achievements, such as the much-touted trace cache, won't be in the Conroe, Krewell said. "Intel just doesn't want to admit it spent all this time and effort on a micro-architecture that went nowhere."

When released in late 2006, Conroe should slot into LGA775 motherboards and might even work with some of today's mobos. Beneath the heat spreader, however, the new chip will be quite different from today's Socket 775 procs. While the Pentium 4 features a 31-stage instruction pipeline and runs up to 3.8GHz, the Conroe will feature a 14-stage pipeline and will likely run around 2GHz.

The dual cores in the first Conroe CPUs will also feature a new ability: Their L1 cache will directly communicate, so if one core needs something that's already in the other core's L1 cache, it can just grab it directly from cache, instead of accessing it across the much slower front-side bus. Intel has also designed the next-gen core with a high-performance engine that can issue four instructions per clock cycle. At its best, the Pentium 4 could issue three instructions per clock and the Pentium M could issue two.

All this, Intel says, amounts to a CPU that should be up to five times faster than the P4 in certain operations, while generating roughly half the heat. What will happen to the P4? Once the multi-core Conroe is introduced late next year, the P4 will probably be rebadged as a Celeron and spend the rest of its natural life toiling away in the value-market Gulag.

INTEL CPUs COMPARED

	PENTIUM III	PENTIUM 4/D	PENTIUM M	NEXT-GEN CPU
MICRO-ARCHITECTURE	P6	Enhanced NetBurst	Banias	Not disclosed
PIPELINE STAGES	10	31	Not disclosed but believed to be 14-17	14
CLOCKS SPEEDS (HIGHEST AT LAUNCH)	450MHz – 1GHz	1.5GHz-3.8GHz	1.6GHz – 2.13GHz	Not disclosed
CORES	1	1 or 2	1 or 2	2 or more
FRONT-SIDE BUS	100MHz, 133MHz	400MHz, 533MHz, 800MHz, 1066MHz	400MHz, 533MHz	Expected to be 800MHz to 1066MHz+
ADVANCED FEATURES	SSE	SSE, SSE2, SSE3, AMD64 NX, Hyper-Threading, Dual Core	SSE, SSE2, NX	SSE, SSE2, SSE3, Dual Core, Vanderpool Technology, Intel Advanced Management Technology, AMD64

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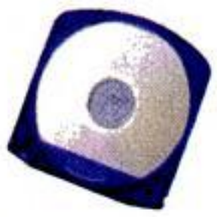
Next-Gen DRM Sucks!



While proponents behind the next-gen optical formats have been busy dazzling consumers with tantalizing features and gigantic capacities of up to 100GB per disc, they're also courting Hollywood with promises of the most draconian digital rights management (DRM) technology ever implemented on removable media.

Both of the upcoming next-gen formats (Blu-ray and HD-DVD) have adopted technology known as the Advanced Access Content System (AACS) as their primary bulwark against piracy. AACS prevents unauthorized duplication by encrypting two keys—one on the disc and another unique to each hardware or software DVD player—with 128-bit encryption. In order to access a disc's contents, both keys must be decrypted. This means that any broadcast or reception point must have AACS support, and network support built into the standard suggests that the technology *might* even require an Internet connection.

Blu-ray is upping the ante with an additional layer of "content management" called BD+, and it's nasty stuff. For example, if a particular DVD is cracked to allow unauthorized copying, the BD+ system permits other discs to carry a firmware payload that will undo the crack. This is tantamount to adding new encryption to discs that have been decrypted. And if an exploit is discovered in a particular model of DVD player—one that, for example, disables region codes—commercial discs could either refuse to play on that player or *disable the player itself*, rendering your hardware unusable until it's serviced or reprogrammed via a BD+ disc update.

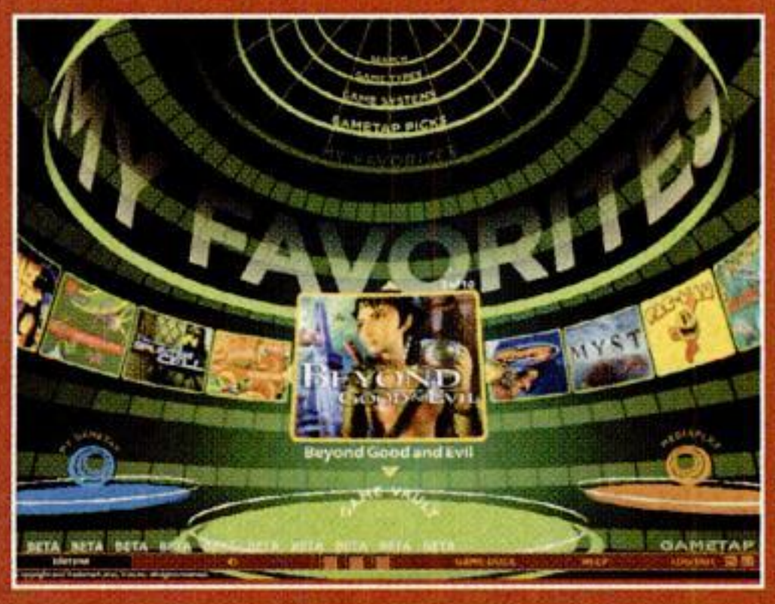
How these technologies will be implemented in PC optical drives is unclear, and as we went to press the Blu-ray Disc Association had not responded to our inquiries.

Liquid-Metal-Cooled Videocard Is a No-Go

When we chatted with Sapphire at E3 this May, company reps were brimming with pride about a new liquid-metal-cooled videocard, dubbed Blizzard. We were told that the card works like a standard liquid-cooling circuit, but instead of water it uses a mixture of the elements gallium and indium—two elements that when mixed in the right proportion turn into a liquid that conducts heat 65 times better than water. The metal was pushed and pulled through the circuit via magnets, eliminating the need for a noisy pump. The new material was so efficient that Sapphire claimed production models wouldn't even need fans (though the prototype, shown above, has two). It sounded too good to be true, and sadly, it was.

Several months after E3, Nanocoolers—the company responsible for building the liquid-metal cooling device—pulled the plug on the project. According to Stephen Kapusta, Sapphire's PR director, Sapphire was not happy about it. "They basically came in and said liquid metal was too expensive," said Kapusta. He said that while the company isn't averse to working with Nanocoolers in the future, next time it will certainly wait until products are finalized before making any announcements.

Old-and New-Skool Games, On Tap



Turner Broadcasting is entering the online-gaming fray with a new service dubbed Gametap. For just $15 a month you gain access to a *huge* catalog of games (300 at launch, with more to come) including everything from *Splinter Cell* to *Dig Dug* and more. It's launching October 3. Take it for a free two-week test drive at **www.gametap.com**.

TOM **HALFHILL**

Multi-Core Programming

Engineers have their own version of the expression "passing the buck." In the cube-farm offices of Silicon Valley, it's called "throwing the problem over the wall." That's what hardware engineers are doing with multi-core processors. After running out of new ways to make processors faster, they are slapping down multiple processor cores on a single chip and daring the software engineers to program the damn things.

Writing software code that runs efficiently in parallel on multiple processors or multiple cores looks hard, and often it's even harder than it looks. One problem is that many general-purpose applications don't easily break down into multiple tasks. For instance, a word processor can use one CPU to read keystrokes and display what you type, but unless you happen to be printing another document simultaneously, there's not much else for a second (or third, or fourth...) processor to do. In fact, the first CPU spends so much time waiting between your keystrokes that it can print something as a background task without breaking a sweat.

Games offer more opportunities for parallelism. However, today's graphics processors already offload most heavy lifting from the CPU. They do the math for plotting 3D vertices, texture mapping, shading, and so forth. At a recent engineering conference, nVidia chief scientist David Kirk said that multi-core CPUs sometimes can't keep up with his graphics processors. Worse, he's seen some games run slower on multi-core CPUs, because the programmers didn't understand how multiple cores interact with the caches.

Operating systems must get smarter, too. Ideally, they should be able to distribute workloads across multiple processors or cores, even if the individual programs contain little or no parallel code. Modern PCs always have several programs running or idling in the background. (To view the list, press Ctrl-Alt-Del and click the Task Manager's Processes tab.) Unfortunately, load balancing isn't easy. It will be years before operating systems catch up with the multi-core trend.

Maybe it's karma. For decades, hardware engineers designed faster microprocessors while too many software engineers got lazy and hid their sloppy programming behind the blessings of Moore's law. Now the programmers aren't getting a free ride any more.

Tom Halfhill was formerly a senior editor for Byte magazine and is now an analyst for Microprocessor Report.

GAME THEORY

THOMAS MCDONALD

Battlefield Blues

If there's one thing I love about console gaming, it's that you know what hardware you're getting when you buy the thing, and you know it will be good for about four years. There are no upgrades, no patches, and no problems. This situation is even more appealing to me these days, now that *Battlefield 2* has shown me exactly how pathetic my PC is. Sure, I could wait until it comes out on the Xbox, I suppose, but a gimped version of *Battlefield 2* on a console would be sick and wrong.

The funny thing is, even though *Battlefield 2* has become my new upgrade temptation game, I still cleave to it. Like an abused puppy continually returning to its cruel master, I fire it up every day and suffer through the long loads, choppy performance, and curiously fluctuating pings.

I have no choice, being a pretty hardcore *Battlefield: 1942/Vietnam* junkie. Objective-based shooters have long been my drug of choice. Deathmatch bores me to tears, and pretty much always has. Compared with solid CTF and control-point action gaming, it's thin gruel with little reward.

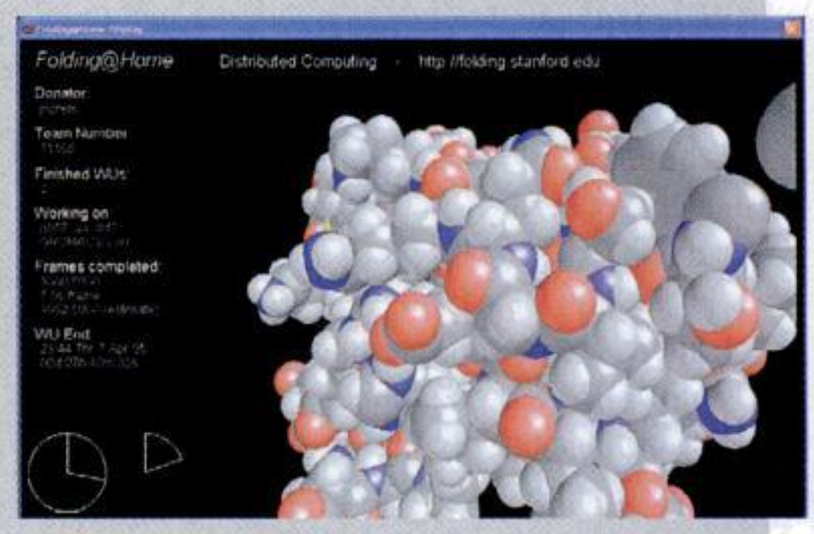
The shift happened when *Tribes* hit, and proved that FPS games could be so much more than mindless fragfests. They could blend action, tactics, team play, and even elements of role-playing into something greater than mere deathmatch. As in any RPG, people quickly fall into their roles in *Battlefield*, and there is no shortage of jobs to fill. Few sessions seem to lack for drivers, gunners, pilots, anti-armor, snipers, demolition, medics, infantry, and the rest. I never fly, for instance, but there are players who do nothing but. This kind of wide-ranging design plugs right into the desires of a huge cross-section of the gaming public, and then pulls them together into a flawless synthesis.

And that quality is what makes it so frustrating. Slouching toward middle age, complete with kids, minivan, mortgage, and the rest, I can't spend money on new hardware every time something tickles my fancy, although I often wonder if socking away money for my kids' college is a better investment than a GeForce 7800 GTX. At this point, I'd almost rather not know about *Battlefield 2* than be cruelly taunted by its 2GB memory demands.

Thomas L. McDonald has been covering games for 15 years. He's currently Editor-at-Large of the old-school game and puzzle mag Games.

Get Your PC Folding!

Folding@Home is the most worthwhile way to put your PC to work for a greater good. Thousands are helping unlock the mysteries of protein folding, and you can too. After downloading and installing the software from http://folding.stanford.edu, join our folding team, number 11108. Then, zap over to www.maximumpc.com/forums for FAQs, dos and don'ts, and witty banter from the Maximum PC folding community.



Six Questions with Ageia

What's up with the still-vaporous Physics Processing Unit? We cornered Ageia's PR man Andy Keane to find out

The physX processor is PCI-based and will sport a rumored 128MB of GDDR3 memory.

1. What has Ageia been working on since E3?

The past few months have been spent finalizing the content and board product for release.

2. Do you have working boards up and running?

Yes, the physX processor has been working since before E3. We've distributed boards and software to developers.

3. Will games that benefit from the physX processor come out this year?

We're working towards a release of games and the physX processor board product late this year.

4. How many titles will be available in the near future that will benefit from the physX processor?

I can't release a specific number because the games are being completed by other companies and we don't have control over their schedules. However, we have publisher-wide deals with Sega, Epic, and Ubisoft.

5. Will there be varying SKUs of the physX board?

There will be just one clock speed and memory configuration for the board.

6. Do you have a ballpark figure for the pricing of the board?

I expect the board to be between $250 and $300.

Liquid Lens for Digicams

Droplet-sized lens could revolutionize cellphone cameras

It sounds like science fiction, but a Singapore-based company has developed a digital camera lens made from liquid that is designed to mimic the way a human eye focuses on objects near and far. Named Fluidlens, it is no bigger than a contact lens yet offers an impressive 10x optical zoom, rivaling the capabilities of high-end point-and-shoot digital cameras.

Unlike standard lenses, which move along a fixed axis until an object comes into focus, the Fluidlens is able to zoom and focus merely by changing the curvature of the lens, which is similar to how the human eye focuses.

The Fluidlens won't be on the market for at least a year, and will most likely show up in mobile phones and other slim devices.

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Winner, Best RPG of E3

– *Game Critics Award, GameSpot, IGN, GameSpy, Xbox Evolved, Console Gold, Daily Game, Games Domain*

"One look at Oblivion will shatter your conceptions about what is possible in a video game."

– *GameInformer*

"The biggest title for the Xbox 360™, and the one I'm most looking forward to."

– *GamePro Magazine*

"Oblivion is, at this time, the best-looking game I have ever seen in my life."

– *Xbox.com*

"To call the graphics 'amazing' is an extraordinary understatement."

– *GameSpy*

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OBLIVION

The RPG for the Next Generation

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Finally, no more tripping over that damned mouse cable!

Geek Tested and Approved

Our headphone cable has been trying to kill us for years now, wrapping itself—like a deadly cobra—around our feet while we're at our PCs, and then making us trip when we step away. Thanks to the Cableyoyo, we're no longer at the mercy of wily wires. We just wind up any loosey-goosey cable inside the device, then unwind just the right amount to attach our headphones. Freedom!

$5, www.cableyoyo.com

City-Wide Wi-Fi on the Way

Metropolitan areas move to provide free wireless Internet for all

San Francisco made headlines recently when its mayor announced plans for a city-wide Wi-Fi network that will be "free or very cheap." The plan for SF comes at a time when several other cities including Philadelphia, Portland, Minneapolis, Charleston, and Orlando are planning similar networks.

The super-size hotspots, spanning more than 135 square miles in the case of Philadelphia, are intended to bring net access to everyone in the city, regardless of income. To this end, Dell will reportedly give thousands of San Francisco's low-income residents cheap PCs, so they too will be able to receive spam email, flame strangers on message boards, and surf eBay until the wee hours of the morning.

You know Philadelphia has cheese steak, but did you know it has free Wi-Fi too?

Intel Admits Dual-Core Was Rushed

An Intel engineer speaking at Stanford University's annual Hot Chips conference shocked attendees with his candor, admitting the company's dual-core CPUs were pushed out the door too quickly in order to compete with offerings from rival AMD.

According to an article published in *Computerworld*, Jonathan Douglas, an engineer with Intel's Digital Enterprise Group, said a big challenge for Intel in developing the dual-core technology was that it had no expertise in designing multi-core CPUs. Douglas also stated that Intel simply failed to design a new memory bus for its dual-core CPUs, so it was forced to use the same bus it was using on the current Pentium 4 processors. Intel's design requires both processor cores to share a front-side bus, which is less efficient than AMD's dual independent bus design.

Even more surprising is Douglas' admission that Intel didn't begin work on the dual-core project until May of 2004, when it announced it was canceling future single-core designs in order to focus on dual-core. AMD then sent a shot across Intel's bow by demonstrating its new dual-core Opteron in September of that year. "We needed a competitive response," said Douglas. "We were behind," he said, without mentioning AMD by name.

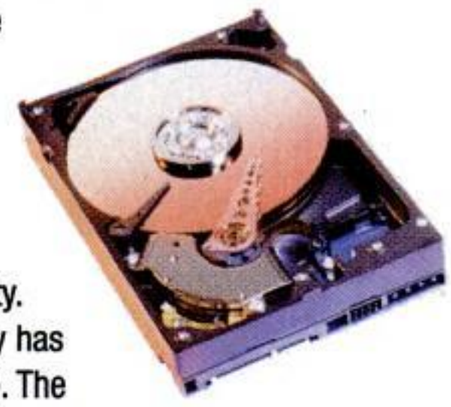
Douglas ended his talk on a positive note, saying the upcoming Pressler CPU will feature two separate CPU dies in a single package, though the company has decided that Pressler won't feature dual independent buses.

FUNSIZENEWS

iBOOKS CAUSE iRIOT

A sale of used iBook laptops for $50 each turned normally peaceful Apple enthusiasts into chair-wielding rioters in Richmond, VA. The 1,000-plus attendees of the iBook blow-out found themselves immersed in chaos as people were pushed, trampled, and even beaten with folding chairs. Rather than lose her place in line, one woman peed her pants while another value-conscious rioter attempted to drive his car through the crowd.

WD INCREASES WARRANTIES



Western Digital has increased the warranty on all its "enterprise" drives to five years. The move mostly affects the company's new Raid Edition drives, which previously sported a three-year warranty. (WD's Raptor already has a five year warranty). The company has also boosted the warranty on its Caviar drives from one to three years. Sadly, all retail packaged drives still include a miserly one-year warranty.

GOLDEN GO-GO JUICE

A new device developed by physicists in Singapore produces electricity from urine. The pee-powered battery is smaller than a credit card and can produce 1.5 volts from just 0.2 milliliters of urine. The current aim for the device is home-based health test kits, though hopefully we'll one day be able to pee into our laptops and iPods for some extra uptime on the road.

WOW TURNS TO OOPS!

A *World of Warcraft* enthusiast was bragging on a local message board about how he was up playing way, way past his bedtime. The only problem is, his mom plays *WoW* too and saw the posting, landing the MMORPG fanatic squarely in hot water. "Pardon me for hijacking the thread, here...," posted his mom, "but, if you don't want your mother to know you were up and on the computer at 3:29 in the morning—*don't* post on a forum that she reads. Busted. Grounded."

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GOOD VS. EVIL

PLAYER VS. PLAYER

EverQuest II

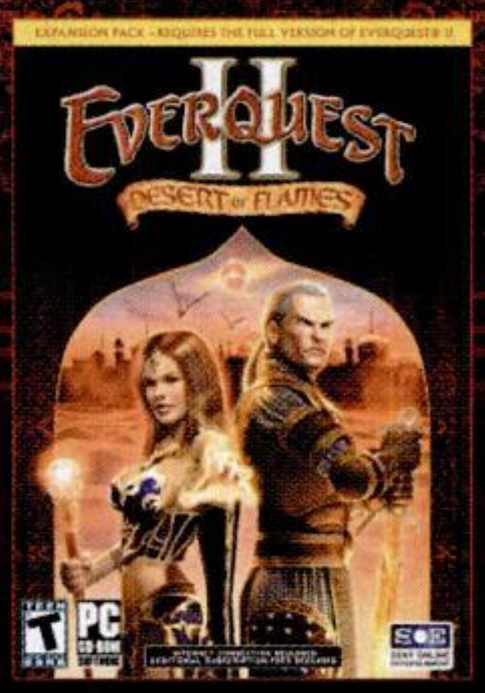
Desert of Flames

WHERE ADVENTURE COMES ALIVE™

Discover the mysteries of an exotic new realm in the first Expansion Pack for the critically acclaimed MMO, EverQuest II.

Desert of Flames brings PvP Arenas, vertical movement, and over 30 new areas to adventure and explore.

Enter the arena to fight for the title of Arena Champion with a robust battle formation and ranking system.



Confront Warring Factions, access Guild Vaults, and play up to Level 60 with Level Range increase.

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Suggestive Themes
Use of Alcohol
Violence
ESRB CONTENT RATING www.esrb.org
Game experience may change during online play.

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Disc-Labeling **Battle**

We've been pretty laid back about it up to now, but it's time to put the smackdown on bad disc-labeling jobs, be they quick chicken-scratch with a Sharpie pen or poorly centered adhesive labels. After all, we're graced with two capable methods for dressing up CDs and DVDs these days: photo printers capable of extremely sharp, full-color printing onto special disc media, and LightScribe, which can burn an image onto special media using the same laser that burns the data, audio, or video onto the other side of the disc. Obviously, if you want color, you go with a color printer, and if you want to avoid the trouble of printers and ink, you go with LightScribe. For those who are on the fence and could go either way, let the games begin.

BY LOGAN **DECKER**

round 1 **PRINT QUALITY**

Well, there's no contest here. By modulating the strength of the drive's burning laser, LightScribe technology can print impressively smooth gray-scale gradients, but it's unable to reproduce very light or very dark shades. There are rumors of a color LightScribe drive around the corner, but if it were up to us we'd rather have nice, inky blacks than weak color. Obviously, LightScribe is no match for a six-color photo printer like the Epson R220 (pictured here) for printing photo-quality images and dark black text. **WINNER: PHOTO PRINTER**

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round 2

SPEED

This could have been the trickiest category of the bunch, as print times for both technologies are largely dependent on the complexity of the image and the print quality level chosen by the user. But alas, the winner was obvious. At maximum quality, Epson's R220 took 2:56 (min:sec) to print a color image; BenQ's DW1625 took 36:14 (min:sec) to print the same image using LightScribe, also at maximum quality. *Ouch*. For a simple text label, Epson's R220 took 1:44 to print eight lines of text; and BenQ's DW1625 cut its time down to 6:35 (min:sec). A LightScribe speed increase is in the works, but it'll have to be a phenomenal jump in order to catch up to photo printers. **WINNER: PHOTO PRINTER**

round 3

PRINT DURABILITY

In a perfect world, this wouldn't even be an issue, because we'd all handle our DVDs and CDs exactly like manufacturers tell us to—lightly and by the edges, like delicate *petit fours*. In reality, however, we grab discs with our grimy thumbs on the label, toss them like Frisbees wherever there's room, and have even seen the cat go at them with that sandpaper tongue. As a result, we know that no matter how dry the ink may be, photo-printed discs will smear under pressure, and LightScribe-labeled discs won't. We were a little surprised to find that LightScribe-etched images fade slightly in direct sunlight, but not at the rate of photo-printed discs. **WINNER: LIGHTSCRIBE**

round 4

CONVENIENCE

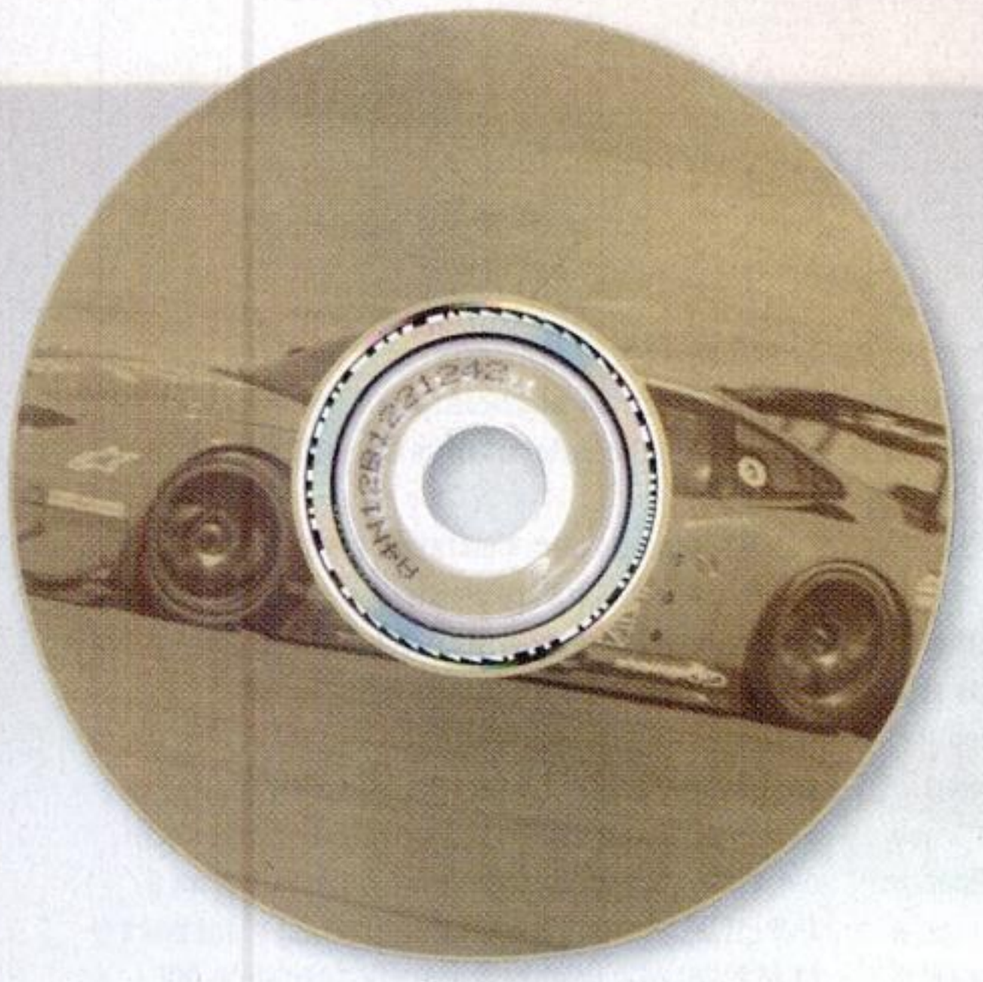
No outrageously priced ink cartridges. No dry-on-the-clothesline time. No hefty hardware squatting on your desk. Guess which technology has these advantages?

LightScribe's burn-flip-'n'-print process might be time-consuming, but it's also effortless, especially now that most CD-mastering applications—such as *Nero* and *Easy Media Creator*—have integrated LightScribe support. Lo and behold, some laptops even come with LightScribe drives for people who are unwilling to tote a photo printer through the airport around twitchy security guards. Of course, you still need special media for either technology, but that's life. **WINNER: LIGHTSCRIBE**

round 5

PRICE

It would have been a real treat if the pokiness of LightScribe was offset by a big price differential, but surprisingly, this isn't the case. Our survey of media prices for photo-printer-ready CDs and LightScribe CDs showed that LightScribe discs were, on average, *three times* more expensive than photo-printer-ready discs. You'd have to print a whole lot of labels on your photo printer before the cost of ink cartridges caught up with the price of LightScribe media. Still, it must be said, that's a small premium to pay if you're a laptop user on the go. **WINNER: PHOTO PRINTERS**



LIGHTSCRIBE DRIVE
BenQ DW1625, $120, www.benq.us

And the Winner Is...

Sorry, no sudden plot twist or surprise ending here. Photo printers work fast and work well, turning out beautiful, full-color discs—something that used to require adhesive labels and a strange-looking contraption with which to apply them. Still, we found ourselves more impressed with LightScribe's showing than we anticipated. It makes good-looking grayscale discs without any additional hardware, and is a perfect fit for those discs you want properly labeled, but not enough to fire up your printing or illustration application. If the burn time can be cut down and the media price slashed, we might find ourselves turning less and less to the photo printer. Hell, we might even print LightScribe discs to use as Christmas ornaments. MPC

Reprinted material

Sarge, Watchdog of the month

Our consumer advocate investigates...

✓eMachines ✓Canon ✓StopSign.com ✓Targus

WHOLE LOTTA LAW

Does your eMachine M5300-series notebook crash from overheating? Law firm Sheller, Ludwig & Badey thinks there's a good possibility it does. The firm, which took IBM to the woodshed over the 75GXP "Deathstar," has filed a suit against eMachines over its M5305, M5309, M5310, M5312, and M5313 notebooks. The firm claims that overheating has caused numerous consumers to experience abrupt shut-downs. "As a result of this propensity to overheat, the 5300-series laptops are essentially unusable in the manner and to the extent to which they are advertised," the suit alleges. eMachines officials were unavailable for comment but the law firm would like consumers who have experienced the problem to visit www.sheller.com/Practice.asp?PracticeID=176 for additional information about the suit.

eMachines isn't the only company of interest to lawyers. Consumers have complained of their Canon PowerShot digital cameras taking a dump with a mysterious "E18" error on the screen. While some say the error occurs only after abuse or being dropped, others say it happens for no reason at all, and usually after the warranty is up. The price to the fix the camera typically exceeds $100. Law firm Girard Gibbs, which gave Apple a serious Indian burn over the iPod battery issue, says it has started an investigation after receiving several complaints about the problem and wants consumers who feel they've received an unwarranted and deadly E18 to visit www.girardgibbs.com/canon.html for more information.

Canon officials told the Dog that the E18 is a general error message relating to the lens assembly. It can be caused, for example, by sand or grit jamming the gears in the camera. The E18 is used in almost every Canon PowerShot with a telescoping lens. Canon says it's quite possible there's a perception of a problem, simply because it sells such a vast number of cameras, making a relatively small percentage of complaints seem large. The company contends there is no widespread failure of the lens mechanism and it stands fully behind its product.

WE GUARANTEE IT!

My brother and I were watching TV late one night when we came across this hilarious ad for something called ***Stop Sign.*** *The corny, poorly scripted ad promised to get your PC "completely virus and spam free" for 16 cents a day.*

Stop Sign's *website,* ***www.stopsign.com****, goes so far as to state: "We guarantee to get you infection free!" First off, how could anyone make such a claim unless all the world's computer viruses came from them? Really, it sounds like a scam to me. I feel sorry for the Joe Schmo out there who doesn't know anything about computers.*

—Andrew Stang

eAcceleration's StopSign Anti-Virus product - Mozilla Firefox
StopSign
Computer Protection Service
HOME
PRODUCTS :: SERVICE :: LIBRARY :: PRICING :: FAQ :: HELP
:: DOWNLOADS ::
Online Backup!
16¢ a Day
SCAN NOW
Free Online Virus Scan
Activate StopSign Today!
The Worldwide market leader in computer protection services:
time is of the essence
We Guarantee to get you Infection Free!
FREE StopSign Downloads
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popup blocker
spyware remover
spam blocker
install
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Research Center
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» Daily Virus Updates
» Spyware Removal
» Anti-Virus Rating
Latest Threats
Testimonials
"This is what I call Class A service."
"You guys are the BEST anti-virus provider out there."
"You are just great! How can I thank you enough??"

A no-virus guarantee and an association with adware raises questions about eAcceleration's *StopSign* product.

The Dog spoke to Terri Adkins of eAcceleration, the publisher of *StopSign* software, about Andrew's (and the Dog's) skepticism regarding the lofty claims. Adkins told the Dog that the company indeed promises to fix every virus on a person's computer. If a fix can't be achieved, the company will refund the person's cash. Adkins said the one thing that makes it different than other antivirus companies is its support. StopSign.com features live people who take consumer calls when a virus problem can't be solved with the application. The company, Adkins said, will go so far as to write a custom script to remove the offending program if the consumer sends a log of the processes running on the machine (similar to Merijn.org's *HijackThis*). The cost, according to Adkins, is about $35 for a one-time custom script or $59 for a year of service. That works out to about $7 a month; $10 a month gets you the addition of dialup access, said Adkins.

How does the company's reputation stack up? Not so great. The Better Business Bureau rates the company paws down because of its "failure to respond to consumer complaints."

It seems that eAcceleration certainly has the inside track on adware prevention—at one point, the company was selling an adware product. eAcceleration's *Download Receiver* is listed by several anti-spyware programs and web sites as an adware program. And when the Dog tried to run *StopSign* on a machine with *AVG* Free virus scanner, Grisoft's antivirus program identified it as a Trojan! What's going on here? The Dog went back to Adkins, who admitted that eAcceleration did make a product that downloaded ads to a computer. But, Adkins explained, that was in the dot.com days before such things were even labeled adware. She said the company has since dumped *Download Receiver* and concentrates mainly on selling antivirus, anti-spy/adware programs. So why would a legit antivirus program such as *AVG* treat the company's web scanner as a Trojan?

Adkins said that's the result of being previously blacklisted by anti-spyware/adware programs. Once you're on those lists, Adkins said, it's difficult to get removed. She said some antivirus programs are kicked into alert by *StopSign's*

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maxumumpc.com.** The Dog promises to answer as many letters as possible, but only has four paws to work with.

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Recall **Alert**

Targus is voluntarily recalling all of its Dual Outlet Slimline Power Inverters and its 150 Watt Car/Aeroplane Dual Outlet Inverters, which might pose a risk of electric shock and fire. The company said it has not received any reports of injuries or fires but asks that owners of the adapters stop using them and contact the company. The inverters were sold in the U.S., Europe, and Canada. In the U.S., the model numbers are APV0601US, APV07US, APV08US, and BUS0008. In Canada, the models are: APV07CA and APV08CA. In Europe, Targus is recalling the APV07EU and APV07UK.

Last year, Targus recalled all of its All-In-One Universal Plug Adapters.

More information is available at www.targus.com/us/recall_inverters.asp. U.S. consumers can call 888.577.4103 for more information. Canadians with the recalled product are urged to call 888.827.4877.

And for those who didn't get the alert last year, Targus recalled its All-In-One Universal Plug Adapter. In the U.S. and Mexico the model number is PA033U, in Canada it's PA033C, in Asia models PA033B, PA033BX, PA033Y001X, and PA033Y002X are suspect, and in Europe, the Middle East, and Africa the model is PA033E. Consumers are urged to immediately stop using the adapter and contact Targus via www.targus.com/us/recall_Powerplug.asp. An online form and contact information for consumers outside the U.S. is also available at that URL.

delivery method: You download an executable that downloads the antivirus scanner along with program trials of other eAcceleration products. She admits that earlier versions of *StopSign* didn't let consumers opt out of the additional applications that were downloaded with the antivirus app, and attributes that to present conflicts with other anti-spyware/virus apps. Adkins said the company has since made it easier to reject the optional apps. That has satisfied some antivirus scanners enough to remove *StopSign* from the blacklist. Indeed, in the Dog's experience, neither the corporate version of Symantec's *Norton AntiVirus* nor Trend Micro's web-based *House Call* were bothered by *StopSign's* executables.

"We're very serious about being an antivirus, anti-spyware company, but we have a past that's really hard to overcome," Adkins told the Dog.

How effective is *StopSign?* The Dog custom-installed the program, without any optional components, on a *Virtual PC 2004* virtual machine running Windows Millennium. The machine remained free of pop-ups and adware. In its scan of Millennium, *StopSign* found a single Double Click cookie. The Dog then intentionally visited a particularly nasty URL that spreads Trojans and spyware, and infected ME. In a subsequent scan *StopSign* found no fewer than 16 Trojans and 12 spyware apps. Because it was a trial scan, *StopSign* didn't fix anything on the Dog's machine, but the app did offer to fix it for $35, which includes the custom script for removal.

From what the Dog can tell, *StopSign* is a legitimate antivirus/anti-spyware program, but there are an awful lot of buttons that encourage to you buy other products eAcceleration sells. The company isn't some boiler room operation, either; it's a public company (although its stock isn't being traded currently.) The Dog thinks *StopSign* is on the up and up, but would like to hear from readers about their experiences before rendering a final opinion. MPC

demonic possession

de•mon•ic (dĭ-mŏn′ĭk)
adj. pos•ses•sion (pə-zĕsh′ən)

- BEING COMPLETELY CONTROLLED BY *passion* OR THE SUPERNATURAL
- A *mania* RESTRICTED TO ONE THING OR IDEA AT THE EXCLUSION OF ALL ELSE
- MOTIVATED BY A *spiritual* FORCE OR GENIUS; INSPIRED
- THE STATE OF A HUMAN BODY UNDER DEMONIC *influence*, WITH THE INTENTION OF USING IT FOR *punishment* OR A TEST.
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XPS experience

Don't let the polished exteriors fool you. Beneath lurks raw power in its purest form. Now you can play with savage fury, get the bad guy before he knows what hit him and unleash the twisted gaming genius within. The Intel® Pentium® D Processor with new dual-core processing† will take your XPS 600 into another realm. The scorching graphics and screaming sound capabilities will kick your senses into overdrive. And your play-it-safe side will value the elite XPS Telephone Support, 1-Year Limited Warranty* and the savings from buying direct from Dell. Ready to run your opponents into the ground? Experience XPS today.

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THE VIDEOCARD SHOWDOWN OF THE CENTURY

ATI VS NVIDIA

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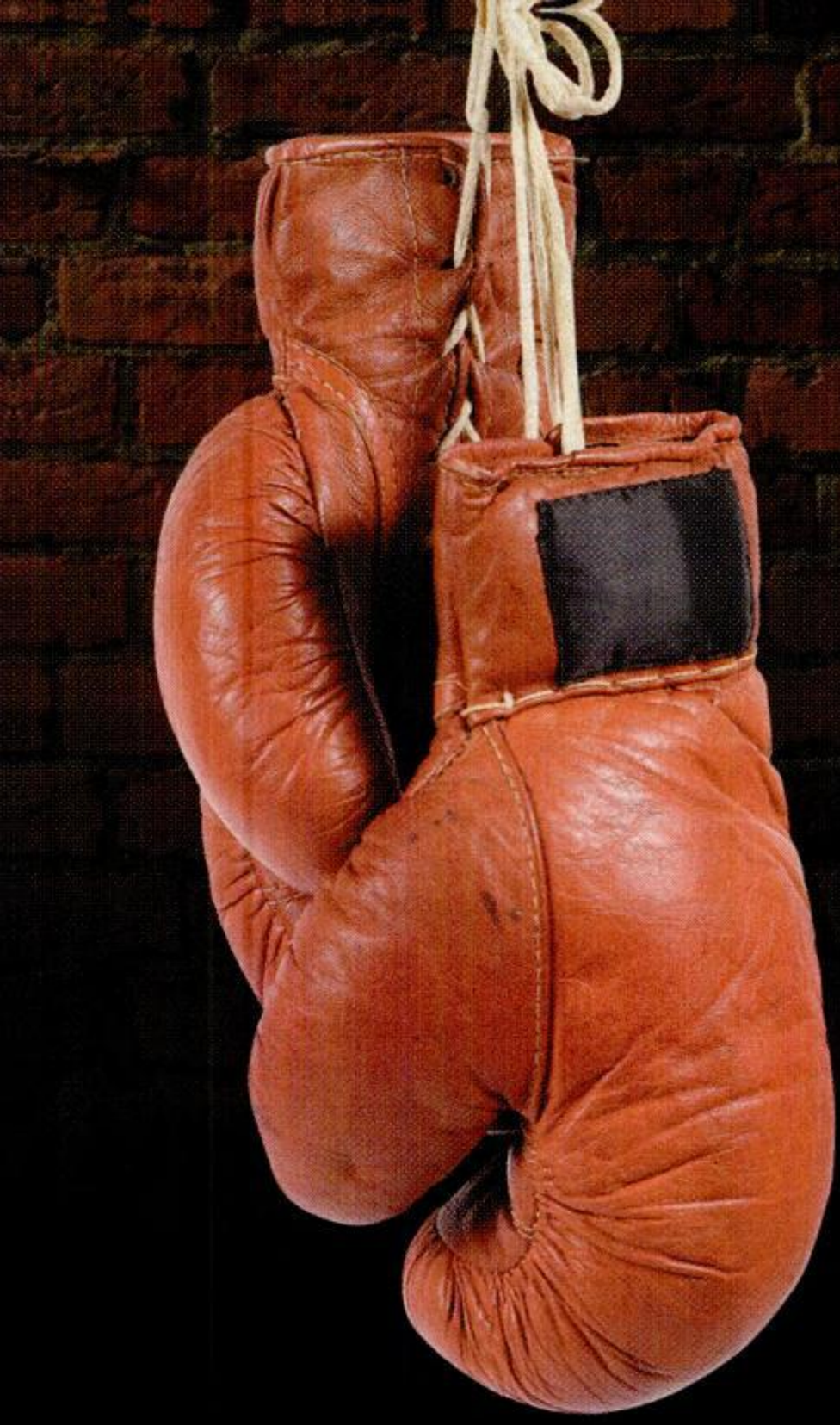

10 CARDS GO TOE-TO-TOE IN FIVE WORLD-TITLE MATCHES!

Good evening, ladies and gentlemen! Welcome to the main event! *Maximum PC's* 2005 videocard showdown, in which 10 of the world's most powerful videocards will face off in mano-a-mano contests for championship belts in five weight classes. Each of our contestants will be judged on their performance in both 3D games and video processing during eight-round bouts.

In the red corner, hailing from Toronto, Canada, is ATI Technologies! Tonight, ATI will field five contenders: the Radeon X800 GT, the X800 XL, the X850 XT, and the X850 XT Platinum Edition graphics-processing units.

And in the green corner, hailing from Santa Clara, California, is nVidia! nVidia will field its GeForce 6600 GT, 6800, 6800 GT, 7800 GT, and 7800 GTX GPUs tonight.

In addition to our blow-by-blow coverage of tonight's title matches, we're proud to present an in-depth buyers guide, so you know exactly what to look for when you purchase your next videocard. We'll also handicap each vendor's chances in the future.

ATI, nVidia: Go to your neutral corners. When the bell rings, come out swingin'!

BY MICHAEL BROWN

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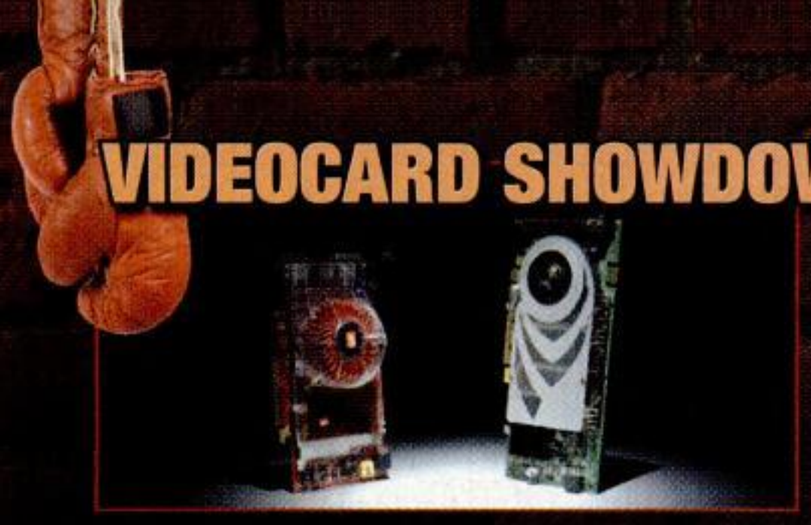


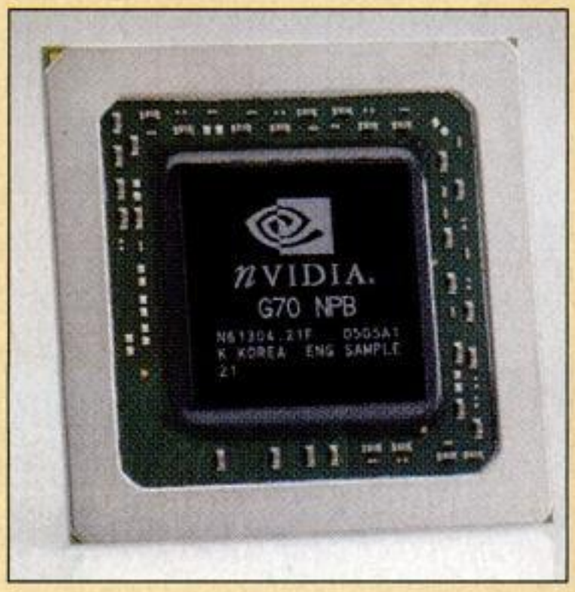
VIDEOCARD SHOWDOWN

BUYERS GUIDE

When you're shopping for a new videocard, it pays to be well informed. The industry has a penchant for flinging gobs of hype and nonsense, but we can show you which videocard specs and features really matter, and which are just marketing baloney.

Finding the right card for your needs and budget requires a firm understanding of these specs and features. You gotta know where to make smart trade-offs. If your budget is tight, for example, you might be better served by a videocard with slower memory and core clock speeds but more pixel pipelines than by a videocard with fast clock speeds and fewer pipes. Here are the most important features to look for.

GPU



The acronym stands for "graphics processing unit," which is the integrated circuit responsible for handling 2D graphics, 3D rendering, and even video. Even the lowest-end GPUs are sufficient for tasks such as word processing and web browsing, but 3D gaming and high-def video playback demand a great deal more horsepower. A GPU's power is determined by the number of pixel pipelines it's outfitted with, the width of its interface to memory, its clock speeds, and support for advanced shader models.

ATI and nVidia own the market for game-oriented videocards with their Radeon X800 and GeForce 6- and 7-series cards, respectively. nVidia sells its GPUs only to third-party vendors, who manufacture and market videocards to OEMs and consumers. ATI offers retail boards in addition to selling its GPUs to OEMs and third-party vendors. Both companies provide ongoing support to end users by offering free driver upgrades that fix bugs and squeeze additional performance from the hardware. There are several factors you need to consider when you're choosing the GPU to buy.

DIRECTX

Microsoft developed this collection of APIs to simplify game development and eliminate compatibility issues with the company's Windows operating system. Support for DirectX is ubiquitous in games, but make sure the card you're considering supports the latest version (DirectX 9.0c as of this writing).

PIXEL PIPELINES

Your GPU executes a series of instructions to apply textures and transformations (transparency, deformation, reflections, and so on) to the pixels that make up the onscreen image. This series of instructions is called a pipeline, and a stream of pixels is constantly pushed through it. The upshot is that the GPU handles millions of pixels every second. Modern GPUs have multiple pipelines operating in parallel, so generally speaking, the more pipes the GPU has, the faster it will be able to render an image.

SHADER MODEL 3.0

This is a composite label for two components of Microsoft's DirectX technology: Pixel Shader Model 3.0 and Vertex Shader Model 3.0. Shader Model 3.0 defines a specific set of functions and features that your GPU's programmable shader units support. Small shader programs run in the shader units, and can define the surface properties of objects in games. A more sophisticated shader model will let game developers create complex and realistic environments while simultaneously reducing CPU and memory overhead.

nVidia's GeForce 6- and 7-series GPUs support Shader Model 3.0 now. ATI's upcoming GPU—code-named R520—is expected to support the technology when it comes to market later this year. Shader Model 3.0 hardware supports higher precision and more advanced conditional operations than earlier revisions. Some companies claim that a card must support Shader Model 3.0 in order to deliver high dynamic-range lighting in games, but that's not actually the case. Support for Shader Model 3.0, therefore, is much less important than most other features.

CLOCK SPEEDS

There are two important clock speeds on your videocard. There's one clock for the GPU (sometimes referred to as the "core clock") and a second clock for the onboard memory. Clock speeds are measured in millions of cycles per second and are stated in megaHertz (MHz). Within a GPU family, and with all else being equal (especially the number of pixel pipelines), the card with the faster clock speed will usually be faster than the card with the slower clock. Comparing the clock speeds of *different* GPU families, however—ATI's Radeon series and nVidia's GeForce series, for example—is not necessarily a reliable indicator of videocard performance, especially if the two GPUs have a different number of pipelines.

If you encounter a videocard with what seems like an outrageously high memory clock speed—1GHz or higher—the manufacturer is probably publishing the memory's "effective" clock speed. DDR RAM is capable of transmitting data on both the rising and falling edges of the clock speed, so DDR RAM clocked at 500MHz has an effective clock speed of 1000MHz, or 1GHz.

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SOFTWARE BUNDLE

Many videocard manufacturers offer "free" software—and sometimes hardware—bundles with their boards in an effort to differentiate their products from the competition. Shop around and you'll soon discover that the bundle is nearly always either a game, application, or gadget that you already own; an outdated version of a product; or something that you had previously decided you didn't want, need, or care much about. It's always reasonable to pay a little more for added performance, but most bundles are merely marketing gimmicks designed to lure the gullible. Benchmark results matter; bundles don't.

MEMORY

The amount of memory on the videocard helps determine the maximum resolution the card is capable of displaying. Budget videocards will have at least 128MB of DDR (double data-rate) RAM, but 256MB is the current sweet spot. DDR2 and GDDR RAM are capable of higher clock speeds than DDR RAM. GDDR RAM was designed specifically for 3D applications: It requires less electrical power and produces less heat than other types of RAM, and can run at even higher clock speeds.

MEMORY INTERFACE

The wider the connection between the videocard's GPU and its memory, the faster the GPU can process data. Budget videocards typically have a 128-bit interface to memory, while higher-end cards usually have a 256-bit interface. Usually it's better to have slower-clocked memory on a wider interface than higher-clocked memory on a narrow interface.

COOLING SYSTEM

Every component inside your PC generates some degree of heat, and videocards produce more than most. A simple heatsink isn't sufficient to keep a high-clocked GPU and memory cool, so manufacturers now mount fans on the circuit boards. ATI's current top-end GPU, the Radeon X850 XT Platinum Edition, gets so hot that it requires a large cooling fan that consumes two slots. nVidia's reference design for its newest GeForce 7800 GTX, which boasts a 110-nanometer process and sophisticated power-management firmware, needs only a single-slot cooler. If you have a cramped case, or need to use all of your expansion slots, you should look for a card that occupies only one slot.

BUS INTERFACE

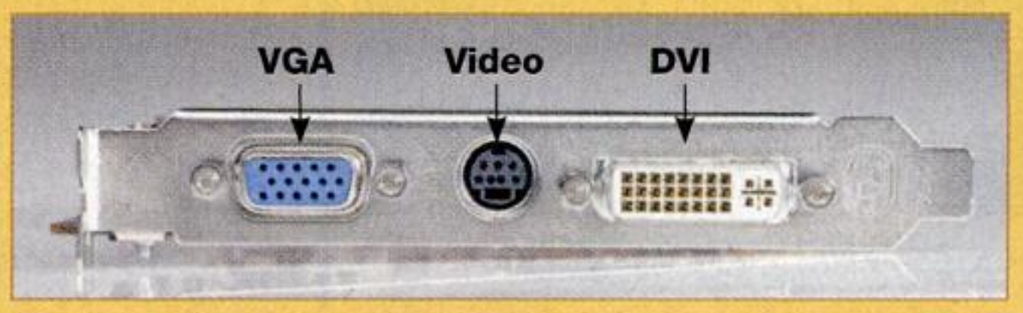
Your PC will have one of two types of videocard bus interface—AGP (Accelerated Graphics Port, shown in the top photo) or PCI Express (shown in the bottom photo). Make sure the videocard you buy is compatible with your motherboard: You can't plug a PCI Express card into an AGP slot, and vice versa. PCI Express is considerably faster than AGP, offering maximum bandwidth of 8GB/s, compared with just 2.1GB/s for AGP.

If your motherboard doesn't have PCI Express slots, your videocard pickins will grow increasingly slim. Neither ATI nor nVidia plan to support the older standard with their newest GPUs. And both companies' dual-GPU solutions—ATI's CrossFire and nVidia's SLI—require PCI Express, as well. If you want the best videocard performance and you're still scraping by with AGP, upgrade your motherboard before you spend money on a new card.

DISPLAY INTERFACE

Typically, videocards have two or three different types of ports you can use to connect your display: DVI, VGA, or TV-out. DVI is used to connect a digital display, such as an LCD, or it can drive an analog monitor via an adapter. VGA connects an analog computer display, such as a CRT. TV-out outputs an S-Video or RCA composite analog video signal that's compatible with consumer televisions, VCRs, and the like.

Most videocards have at least one DVI port and one VGA port. High-end cards offer dual DVI ports, so you can run two flat-panel displays in digital mode, or any combination of analog and DVI displays with the appropriate adapters. Cards that support TV-out usually include a breakout cable with connectors for composite, S-Video, and—if the card supports high-definition TV—component video. Better cards will have a VIVO (video-in/video-out) port instead of TV-out. This type of port can both input and output a TV-compatible analog video signal. Videocards with VIVO ports can digitize analog video in real time, which makes them suitable for basic nonlinear video editing.



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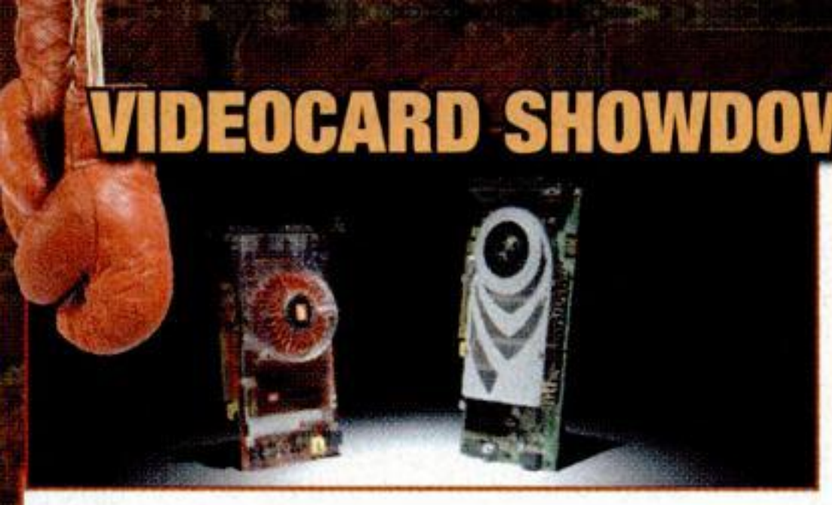
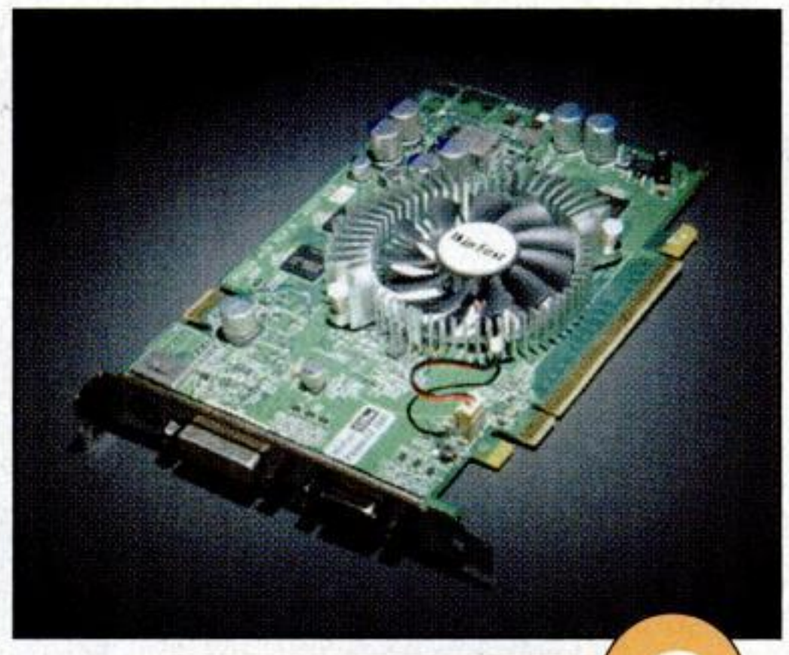
VIDEOCARD SHOWDOWN



$200 BATTLE ROYALE

Buying an ultra-budget videocard once meant making tremendous compromises in quality; fortunately, that's no longer the case. These days, you'll find compelling values in both ATI and nVidia-powered videocards.



LEADTEK PX6600GT TDH **6**

$165, www.leadtek.com

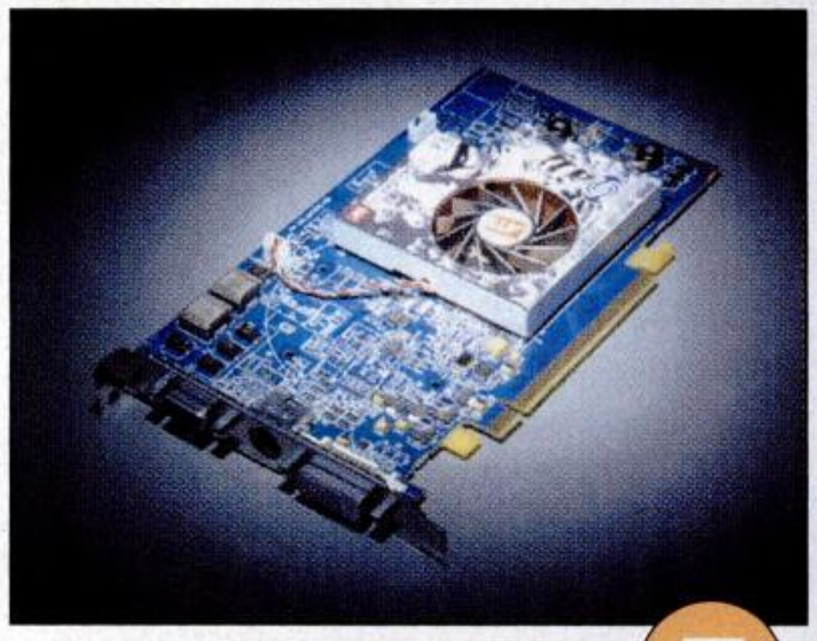
LEADTEK WINFAST PX6600GT TDH

Leadtek's WinFast PX6600GT TDH is a by-the-book implementation of nVidia's GeForce 6600 GT. The board's GPU and 128MB of GDDR3 memory are clocked at 500MHz, per nVidia's reference design. As such, it can't compete with Sapphire's 256MB Radeon X800GT—at least not in terms of games performance.

The PX6600GT lagged behind the Sapphire in most of our gaming benchmarks, including *Doom 3,* typically a strong point for nVidia-powered cards. On the other hand, you can install a pair of these cards in an nForce4 motherboard, a feature that the ATI-powered board won't be able to match until CrossFire reaches the market. And when it comes to MPEG-2 decoding, Leadtek's board beats the living snot out Sapphire's—a major consideration if you're looking to output video to TV.

SAPPHIRE RADEON X800 GT

The eight pixel-pipeline GPU in Sapphire's Radeon X800 GT is clocked slightly slower than the GeForce 6600 GT in Leadtek's card (486- vs. 500MHz), but its memory configuration more than compensates for the difference: Sapphire's card is not only equipped with twice as much GDDR3 memory as Leadtek's, but the GPU's 256-bit memory interface is twice as wide. This helps explain Sapphire's superior benchmark performance in nearly every category.



SAPPHIRE X800 GT **7**

$170, www.sapphiretech.com

ATI will eventually ship its CrossFire dual-GPU solution, but from what we understand of ATI's technology, it wouldn't make sense to use the X800 GT card in a CrossFire configuration. Here's why: The CrossFire Edition boards will achieve parity with whatever card they're paired with, so if you couple a 128MB X800 CrossFire Edition card with the X800 GT, half the X800 GT's frame buffer will be wasted. Pair the card with a 256MB X800 XL CrossFire Edition, and half the CrossFire's pixel pipelines will shut down.

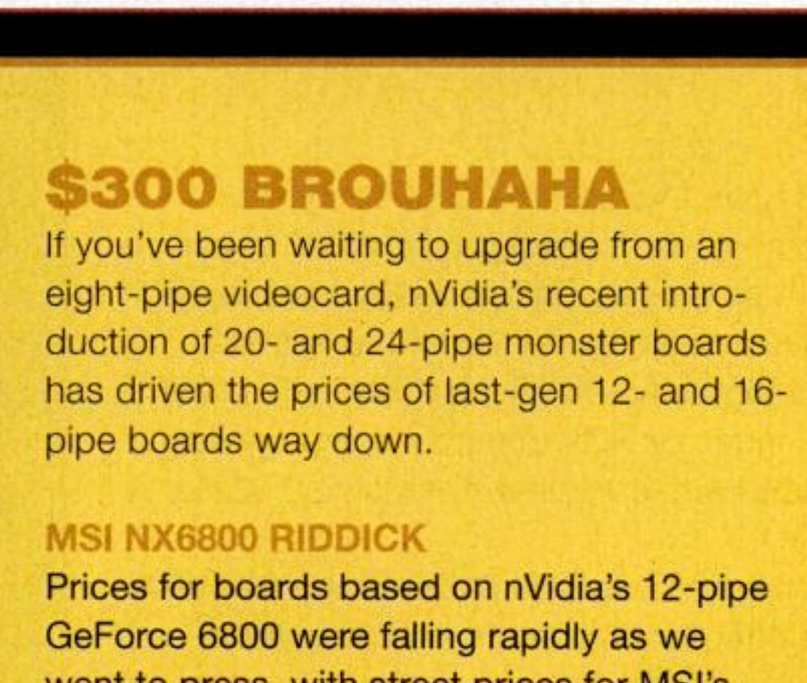
$300 BROUHAHA

If you've been waiting to upgrade from an eight-pipe videocard, nVidia's recent introduction of 20- and 24-pipe monster boards has driven the prices of last-gen 12- and 16-pipe boards way down.

MSI NX6800 RIDDICK

Prices for boards based on nVidia's 12-pipe GeForce 6800 were falling rapidly as we went to press, with street prices for MSI's NX6800 Riddick as low as $285 (before a $30 mail-in rebate). After comparing this card's performance with the much faster Radeon X800 XL board from Connect3D, we expect to see that trend continue.

Based on specifications alone, it comes as no surprise that Connect3D's 16-pipe board delivers higher benchmark numbers than the NX6800. In addition to having four fewer pixel pipelines, the nVidia GeForce 6800 at the heart of this product can only be paired with old-school DDR1 RAM. We were surprised to discover, however, that the MSI board just barely exceeded the performance of Leadtek's less-expensive GeForce 6600 GT. Superior MPEG-2 decoding and SLI capabilities can't compensate for this card's poor gaming performance.



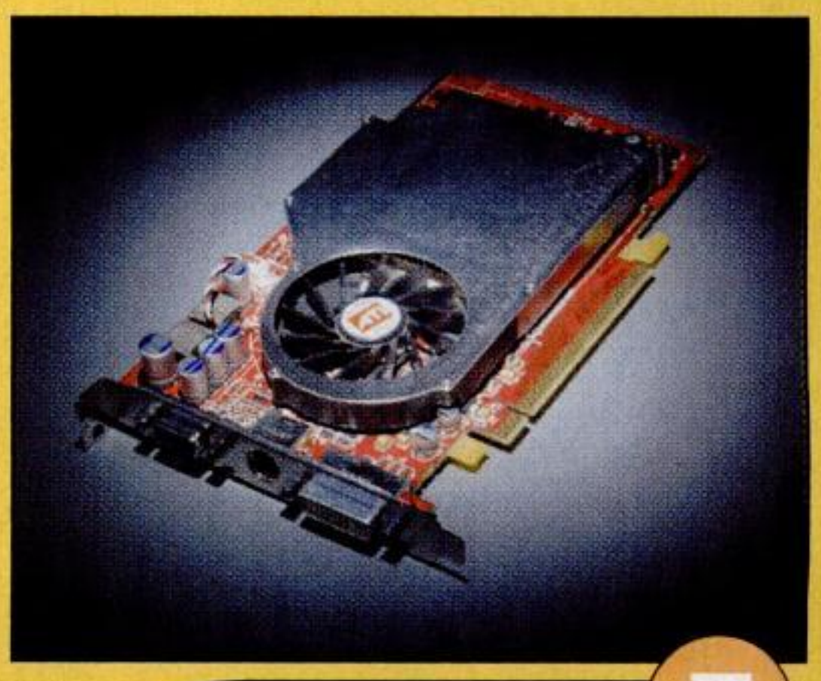
MSI NX6800 RIDDICK **5**

$285, www.msi.com.tw

CONNECT3D 3028 RADEON X800XL

We reviewed ATI's own implementation of the Radeon X800 XL back in July, and we like Connect3D's board just as much. As we suggested back then, a 16-pipe card with a 256-bit interface to 256MB of GDDR3 memory is the sweet spot for people interested in performance at a decent price.

The delta in games performance between this and MSI's GeForce 6800 card just can't be overemphasized: When we ran *Doom 3* at "high quality" at 1600x1200 resolution and 4x antialiasing, the Radeon X800 XL delivered 31fps, compared with the GeForce 6800's 24.6. When ATI ships its CrossFire solution, the X800 XL will be the minimum card you'd want to partner with the 16-pipe CrossFire card. As we discovered with all the ATI GPUs, however, this board's MPEG-2 video performance pales in comparison to that of the GeForce card.



CONNECT3D X800XL **7**

$285, www.connect3d.com

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IT'S IN THE DARKEST DAYS
WHEN A LEADER MUST STEP INTO THE LIGHT.

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POWERED BY gamespy

ATi

DUNGEON SIEGE II

VIDEOCARD SHOWDOWN

$400 ALTERCATION

For around $400, videocard performance starts to become interesting to hardcore gamers. In the wake of nVidia's introduction of the GeForce 7800 GT, it's also the point at which prices are most volatile.

XFX GEFORCE 6800GT **8**

$345, www.xfxforce.com

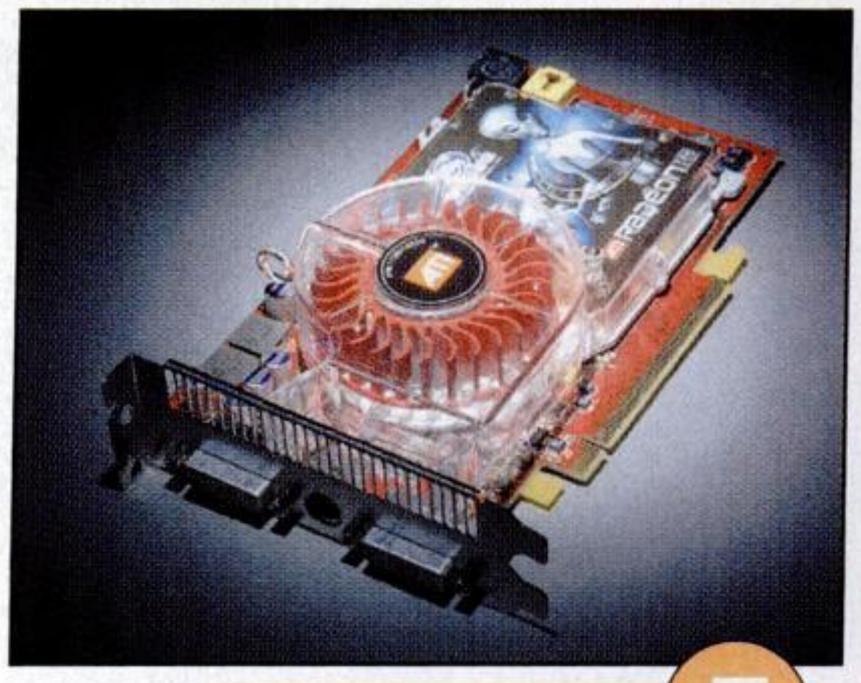
XFX GEFORCE 6800GT

As we were going to press, the street prices for GeForce 6800 and 6800 GT boards were plummeting. XFX just announced a $50 mail-in rebate for this board, taking its street price into the under-$300 range. Being a performance-oriented bunch of folks, we generally favor performance over price, but given the huge delta in street prices between this board and Sapphire's slightly faster Radeon X850 XT, and looking at the narrow differences in performance, we have to give the nod to XFX's GeForce 6800GT.

Besides, we know the XFX board will run in SLI mode today (in fact, in SLI, it spanked a single, highly overclocked Extreme N7800 GTX Top on page 30). Who knows when ATI customers will be able to harness a pair of X850 XTs?

SAPPHIRE 100103-RD RADEON X850 XT

If Sapphire had sent its X850 XT board that's outfitted with one VGA and one DVI port, it would have fit our under-$400 price point. This dual-DVI version increases the card's cost to $440! But considering that it was 1.9fps slower than XFX's much cheaper GeForce 6800GT playing *Doom 3*, and only 9.6fps faster with *Far Cry*, we don't consider it a good value at either price point.



SAPPHIRE X850 XT **5**

$440, www.sapphiretech.com

The faster-clocked Sapphire board (we clocked its core at 533MHz and its GDDR3 memory at 554MHz) requires an unappealing two-slot cooler. We were also disappointed with ATI's MPEG-2 decoding. This GPU performed better than ATI's lower-end chips, but it remains inferior to all the nVidia solutions we tested. If you're craving VIVO for video-editing exploits, on the other hand, the X850XT will punch your ticket. The XFX board offers only TV-out.

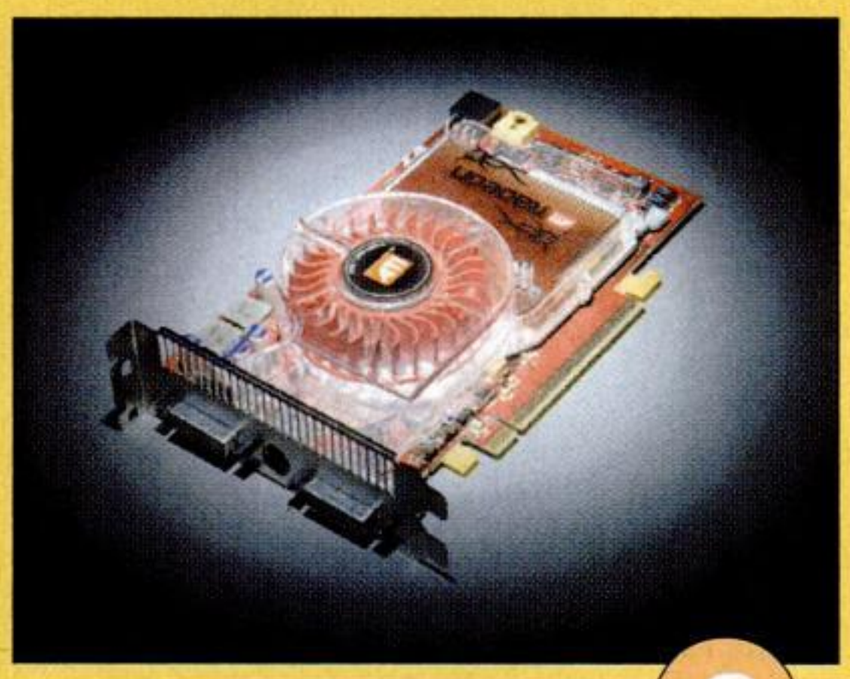
$500 SMACKDOWN

This is the price category in which ATI suffers most over the delay in shipping its next-generation R520. We had to pit ATI's aging top-of-the-line X850 XT Platinum Edition against nVidia's second-tier GeForce 7800 GT.

ATI RADEON X850 XT PLATINUM EDITION

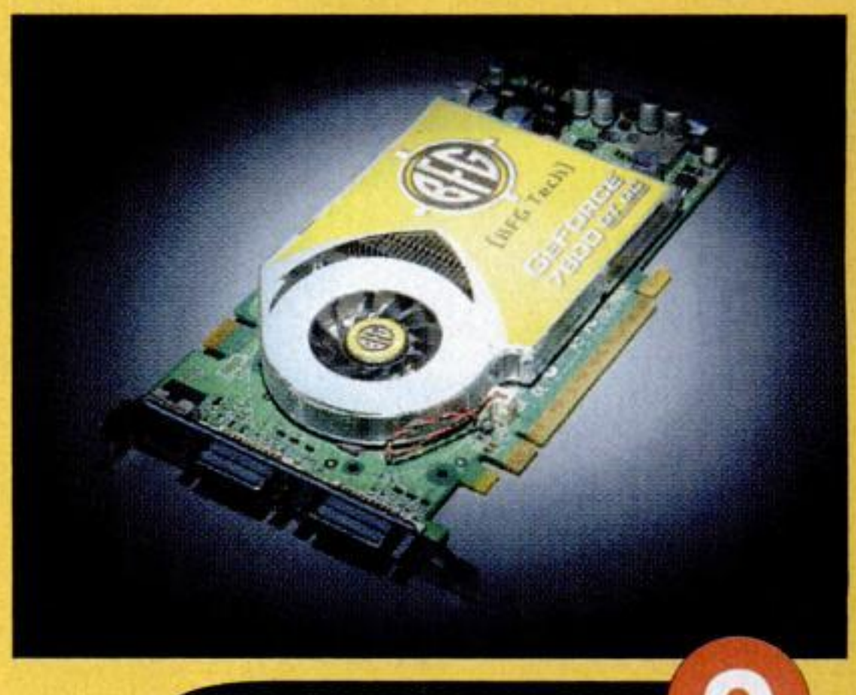
This board earned the distinction of being "the fastest videocard we've ever tested—by a hair" back in February of this year, but that wasn't enough to earn it a Kick Ass rating. In fact, it mustered just an 8 verdict.

And compared with BFG's GeForce 7800 GT OC, ATI's Platinum Edition looks more like tin. With a street price $60 higher than its rival, the ATI board managed to post a slightly better benchmark score in just one game: *Far Cry*. The 7800 GT-based card pummeled it on every other test. But then, that's pretty much what we expected to see when this 16-pipe card entered the ring against the 20-pipe contender. Sure, the ATI has higher clock speeds—a 547MHz core and GDDR3 memory that whizzes along at 594MHz—but that wasn't nearly enough to overcome the BFG's four extra pipes.



ATI RADEON X850 XT PE **6**

$480, www.ati.com



BFG GEFORCE 7800 GT OC **9**

$420, www.bfgtech.com

MAXIMUM PC KICKASS

BFG GEFORCE 7800 GT OC

If, as we suspect, ATI was knocked back on its heels when nVidia both announced and shipped the GeForce 7800 GTX on the same day, the company must really be reeling from nVidia's next punch: the less-expensive, nearly as powerful GeForce 7800 GT.

The GeForce 7800 GT is almost identical to the GeForce 7800 GTX, but it has four fewer pixel pipelines (20 versus 24) and slower clock speeds. The "OC" in this implementation, however, stems from BFG's decision to overclock the board's GDDR3 memory and graphics core to 525- and 425MHz, respectively, compared with nVidia's reference-design specs of 500- and 400MHz. Drop a pair of these in an SLI-capable motherboard and you'll get *Doom 3* at 1600x1200 resolution with 4x antialiasing blasting out of your monitor at 81.2 frames per second. That's Kick Ass performance in our book.

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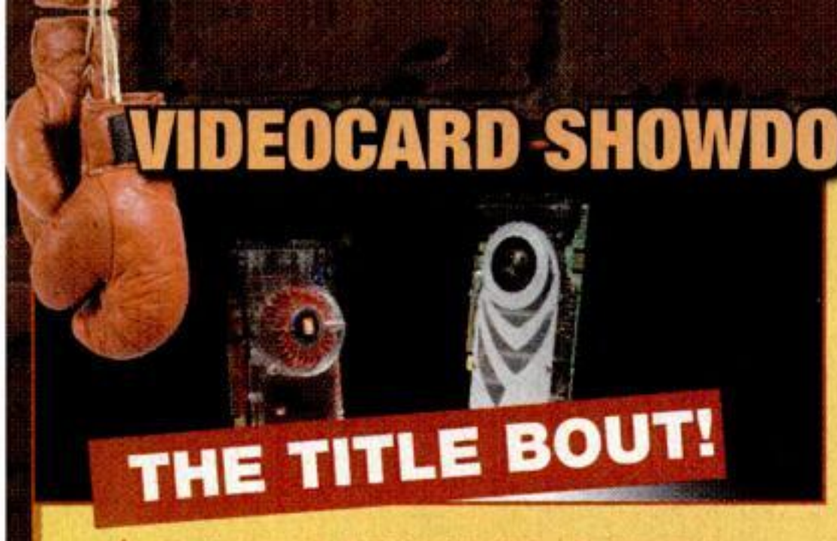
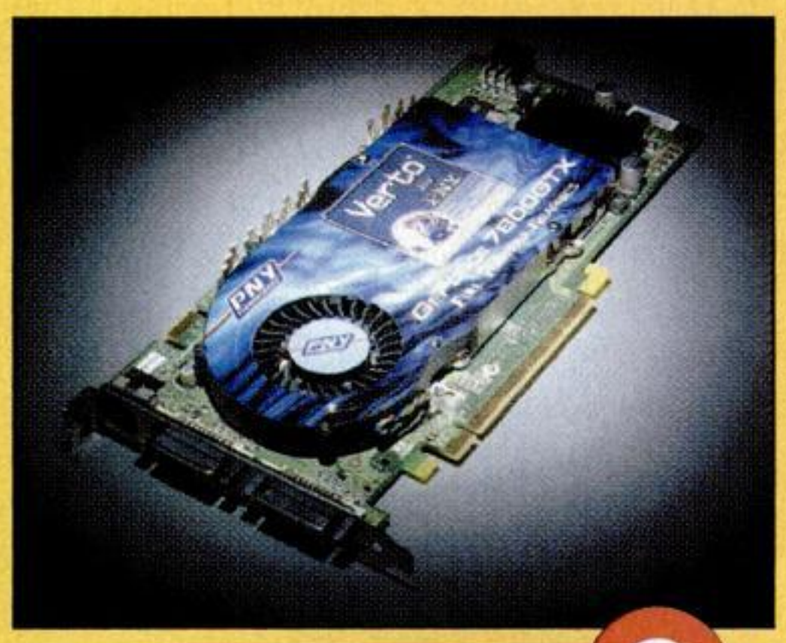
VIDEOCARD SHOWDOWN



$600 SHOWDOWN

Throwing ATI's X850 XT Platinum Edition into the ring against nVidia's powerhouse GeForce 7800 GTX would have been like pitting Bill Gates against Butterbean. So until ATI ships its R520 GPU, the best we can do is to pit one GeForce 7800 GTX board against another!



PNY VERTO 7800 GTX — 9

$520, www.pny.com

MAXIMUM PC KICKASS

PNY VERTO GEFORCE 7800 GTX

PNY's GeForce 7800 GTX implementation is a straightforward nVidia reference design: The graphics core is clocked at 430MHz and the 256MB of memory hums along at 600MHz. You'll find dual DVI outputs as well as a VIVO port on the mounting bracket.

But when we're handed a $520 videocard that boasts a 24-pipe GPU, we're not about to sniff about a reference design. And while PNY's Verto didn't turn in benchmark numbers that compete with Asus' wildly overclocked implementation; the Verto isn't weighed down by a fan that consumes two expansion slots.

If we *had* pitted this card against ATI's current best, ATI would have left the ring in a body bag. Playing *Doom 3*, the PNY board turned out 53.6fps, compared with the ATI's 40.2fps. Running *3DMark03*, PNY scored 16,074 to ATI's 13,170. No, a 24-pipe GPU is no match for a 16-piper.

ASUS EXTREME N7800 GTX TOP

Word on the street is that Asus pays nVidia a premium to get pick-of-the-litter GeForce 7800 GTX GPUs, with the express intent of using them to build over-the-top videocards. Whether that's gospel truth or just marketing hype, Asus' Extreme N7800 GTX Top is the fastest videocard we've ever tested.

We thought the 7800 GTX marked the end of two-slot cooling solutions, but Asus has so overclocked this board's memory and graphics core that a stock cooler just wouldn't do the job. We measured the core running at a whopping 486MHz and the DDR3 memory cruising along at 675MHz. How do those specs translate into performance? How about *Doom 3* at 1600x1200 resolution with 4x AA at 60.5fps—a full 7fps faster than PNY's more conventional design, and nearly 4fps faster than the overclocked XFX GeForce 7800 we reviewed in September.

ASUS EXTREME N7800 GTX — 10

$570, www.asus.com

MAXIMUM PC KICKASS

BENCHMARKS

	DOOM 3 (fps)	FAR CRY (fps)	HALO (fps)	3DMARK05 (fps)	3DMARK03	3DMARK03 Game 2 (fps)	3DMARK03 Game 4 (fps)	HQV Score
LEADTEK WINFAST PX6600 TDH	18.1	35.1	**44.0**	3,626	8,562	**12.9**	15.4	**73**
SAPPHIRE RADEON X800 GT	**18.3**	**49.4**	42.7	**4,213**	**9,566**	12.2	**23.0**	55
MSI NX6800 RIDDICK	24.6	46.4	42.6	3,887	9,218	15.8	22.3	**73**
CONNECT3D 3028 X800XL	**31.0**	**60.2**	**58.6**	**5,092**	**10,921**	**22.3**	**32.2**	55
XFX GEFORCE 6800GT	**39.8**	71.2	63.3	5,145	11,945	24.6	28.1	**78**
SAPPHIRE RADEON X850 XT	37.9	**80.8**	**78.0**	**6,189**	**12,648**	**26.5**	**38.3**	65
BFG GEFORCE 7800 GT OC	**49.7**	84.2	**87.4**	**6,911**	**14,894**	**32.2**	**46.2**	**83**
ATI RADEON X850 XT PE	40.2	**87.1**	80.2	6,468	13,170	28.4	41.1	65
PNY VERTO GEFORCE 7800 GTX	53.6	81.5	102.6	7,648	16,074	33.8	47.9	**83**
ASUS EXTREME N7800 GTX TOP	**60.5**	**91.3**	**111.2**	**8,560**	**17,698**	**39.8**	**58.7**	**83**

Best scores in each category are bolded.

HOW WE TESTED

TEST SYSTEM: Athlon FX-55, nForce4 SLI motherboard, 2GB DDR RAM

DOOM 3: Timedemo 1 tested at 1600x1200, High Quality, 4x AA

FAR CRY: Boat level tested at 1600x1200, all settings on High (water at Ultra High), 4x AA, 8x aniso

HALO: Timedemo script tested at 1600x1200

3DMARK03 GAME 2 AND GAME 4: Tested at 1600x1200, 4x AA, 8x aniso

3DMARK03 AND 3DMARK05: Tested using default settings

HQV: See page 31 for details

SPECS

VIDEOCARD	GPU	PRICE	MEMORY	PIXEL PIPELINES	CORE CLOCK	MEMORY CLOCK
LEADTEK PX6600	nVidia GeForce 6600 GT	$165	128MB	8	500	500
SAPPHIRE X800 GT	ATI Radeon X800 GT	$170	256MB	8	486	506
MSI NX6800	nVidia GeForce 6800	$285	256MB	12	325	300
CONNECT3D X800XL	ATI Radeon X800 XL	$285	256MB	16	398	493
XFX 6800GT	nVidia GeForce 6800 GT	$345	256MB	16	350	515
SAPPHIRE X850 XT	ATI Radeon X850 XT	$440	256MB	16	533	554
BFG 7800 GT OC	nVidia GeForce 7800 GT	$420	256MB	20	425	5250
ATI X850 XT PE	ATI Radeon X850 XT PE	$480	256MB	16	547	594
PNY 7800 GTX	nVidia GeForce 7800 GTX	$520	256MB	24	430	600
ASUS N7800 GTX	nVidia GeForce 7800 GTX	$570	256MB	24	486	675

BENCHMARKS

GEFORCE SLI BENCHMARKS	DOOM 3 (fps)	FAR CRY (fps)	HALO (fps)	3DMARK05	3DMARK03
LEADTEK PX6600	34.0	37.3	77.4	6,523	14,608
MSI NX6800	44.7	76.7	76.7	7,137	15,381
XFX 6800GT	68.7	111.3	93.4	9,234	19,544
BFG 7800 GT	81.2	124.1	124.5	11,047	24,810
PNY 7800 GTX	84.4	128.6	129.1	11,379	26,768

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VIDEO QUALITY BENCHMARKS

Games are one of the best measures of a videocard's rendering horsepower, but *Maximum PC* readers don't buy state-of-the-art hardware just to play games. We conducted these tests to measure each videocard's ability to process MPEG-2 video from a DVD.

The results surprised us. We had long suspected that ATI did a better job of processing video, but these benchmarks indicate the opposite. We also discovered that DVD movies look terrible played back on nVidia cards in SLI mode. nVidia tells us an SLI version of its PureVideo decoder is in the works; until that's released, SLI users should disable SLI while watching DVDs.

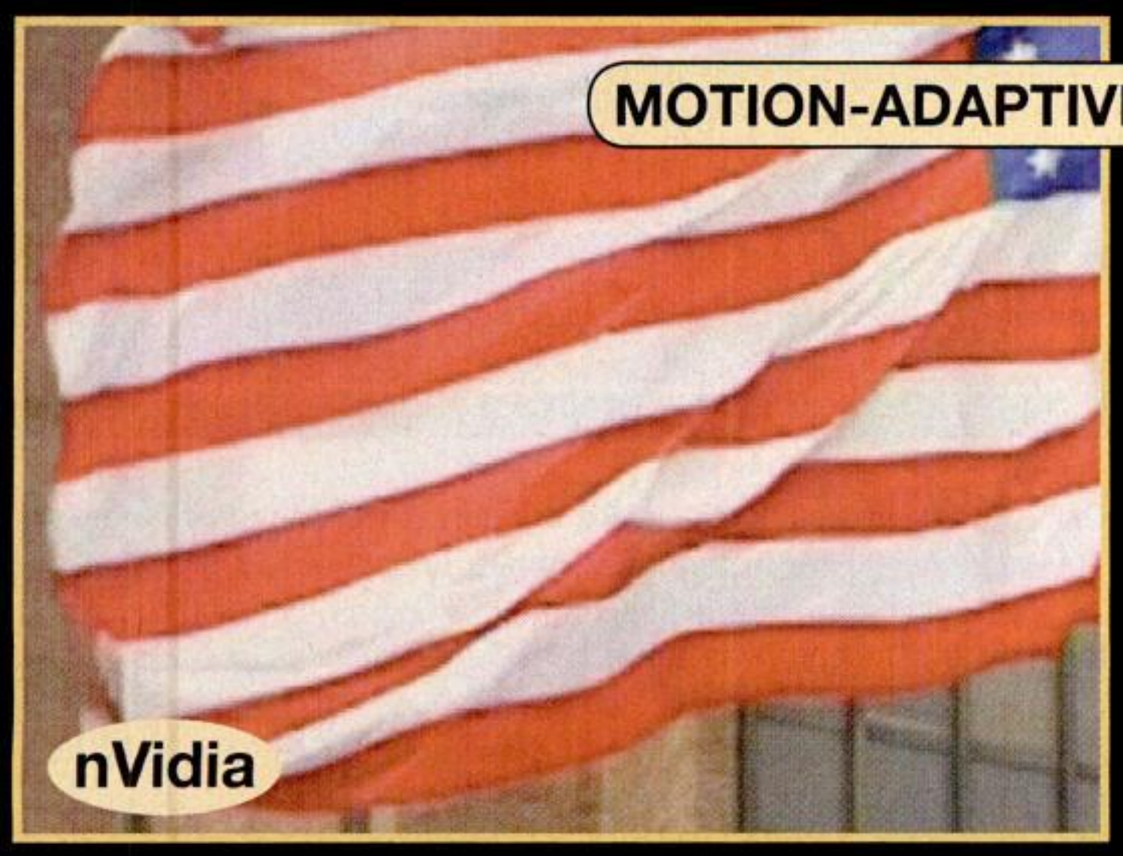
3:2 PULLDOWN

DVD video is displayed at either 30 frames per second on a standard-definition TV (with each frame consisting of two interlaced fields), or 60 frames per second on a progressive-scan high-definition TV or computer monitor. Motion-picture film, however, is shot, edited, and screened at 24fps, progressive scan. A conversion process must be used to find a common mathematical relationship between film and video.

One of the most common conversion techniques is known as 3:2 pulldown, so named because one frame of film is repeated in every fifth field of video. The videocard should detect the extra frame and remove it, to present smooth motion. During electronic editing, however, discontinuities in the 3:2 cadence are often introduced. If the videocard doesn't correct for this, the image will lose detail.

Each of the nVidia-based cards passed this test without a problem. The moiré pattern in the grandstands of the ATI screengrab, however, reveals that the X850 XT Platinum Edition lost track of the 3:2 cadence. We encountered this same problem with each of the ATI-based cards we tested.

MOTION-ADAPTIVE DE-INTERLACING



Standard-definition video is interlaced, meaning each frame consists of two fields; one containing the odd-numbered scan lines and the other containing the even-numbered scan lines. A standard-definition television draws the odd-numbered scan lines first (1, 3, 5...), and then goes back and draws the even-numbered scan lines (2, 4, 6...). This occurs fast enough that the eye perceives the two fields as a single image, but interlaced video creates images with scan-line artifacts in the form of jagged edges along diagonal lines.

A videocard de-interlaces video, so each scan line is drawn in sequence (1, 2, 3, 4, 5, 6...) on a progressive-scan monitor. But this conversion process won't remove scan-line artifacts without additional processing. Motion-adaptive algorithms must be applied in order to remove the jaggies. Examining the stripes in the flags in the two shots above, we can see that nVidia's motion-adaptive de-interlacing (the flag on the left) is fairly effective; while ATI's (the flag on the right) is not.

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VIDEOCARD SHOWDOWN

NVIDIA'S SLI VS. ATI'S CROSSFIRE

When nVidia announced its Scalable Link Interface (SLI) technology in September 2004, industry observers knew ATI would have to respond with a dual-GPU technology of its own. ATI finally did, announcing CrossFire in May 2005. As we were going to press in mid-August, however, ATI informed us that the X850 XT CrossFire Edition was still "in the final stages of qualification" and that we wouldn't receive evaluation hardware by our deadline.

In any event, here's what we know about SLI and CrossFire to date.

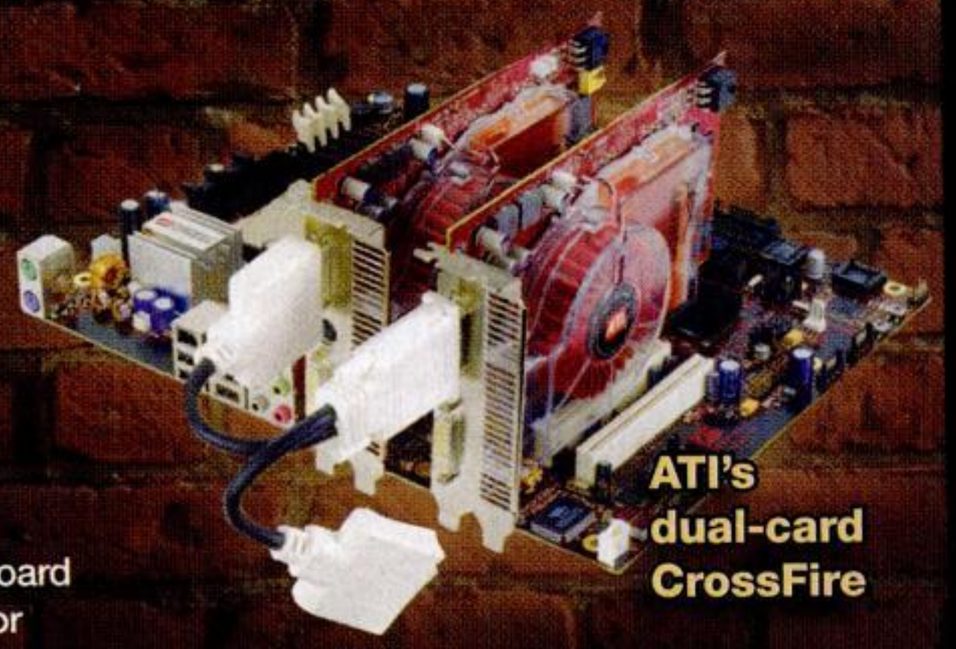
nVidia's dual-card SLI

NVIDIA SLI

nVidia's SLI solution requires a motherboard with an nVidia nForce4 chipset, two x8 or x16 PCI Express expansion slots, and a proprietary SLI connector board that bridges two matching GeForce videocards.

The two cards must sport the exact same GPU—you can't pair a 6800 Ultra card with a 7800 GTX, for instance. What's more, both cards must also be from the same manufacturer—a situation that nVidia intends to change with its ForceWare 80 driver update. The two cards maintain separate frame buffers, but output to a single monitor.

As you can see from the benchmark numbers on page 30, SLI delivers a substantial increase in performance—but we've yet to see the "up to 2x" leap in performance that nVidia touts.



ATI's dual-card CrossFire

ATI CROSSFIRE

Not to beat a dead horse, but everything we can report about ATI's dual-GPU solution is old news—except pricing.

CrossFire will require a motherboard with an ATI CrossFire chipset and two PCI Express expansion slots. ATI has announced three CrossFire Edition videocards: Two are based on 16-pipe GPUs (the $300 X800 XL and the $350 X850 XT) and are outfitted with 256MB each. The third card is based on ATI's eight-pipe X800 GPU and comes with 128MB of memory. It will be priced at $200.

CrossFire Edition cards can operate on their own or be paired with any second videocard based on the same GPU series. You can link an X800 XL CrossFire Edition card, for instance, to any manufacturers' X800, X800 GT, or X800 XL product. But there's a catch: The system will achieve parity by resorting to the lowest common denominator in terms of pixel pipelines and frame buffer. Harness a 16-pipe X800 XL CrossFire Edition to a 12-pipe X800 Pro, for instance, and the CrossFire board will shut down four of its pixel pipelines.

ATI'S NEXT-GENERATION GPU

If you think ATI is uptight about revealing new information about CrossFire, try asking about its much-delayed next-generation graphics core, code-named R520. Industry analysts expected to see this chip by the summer of 2005, but board manufacturers we spoke with in late-August said ATI told them not to expect even samples until mid-October—nearly six months after cards based on nVidia's own next-gen part were already on store shelves.

Our sources tell us the as-yet-unnamed chip will feature a 90-nanometer process, that it will (finally) support Shader Model 3.0, and that it will boast a 512-bit memory interface. Sources also tell us R520-based cards will be available in four configurations: the R520 XT and R520 XT CrossFire Edition (both of which will require a dual-slot cooler), and the R520 XL and R520 Pro (both of which will use a single-slot cooler).

OUR TOP VIDEOCARD PICKS

ATI has had more than its fair share of missteps so far this year, but the company's lower-priced Radeon GPUs helped ATI and its partners win at least the first two matches in this series of championship bouts. But each of those wins comes with two major caveats: The first—that nVidia has a dual-GPU solution, and ATI doesn't—could become a moot point if ATI manages to ship CrossFire and it works as promised. The second—ATI's across-the-board poor showing in our video benchmarks—isn't so easy to overcome.

In the lightweight class, **Sapphire's Radeon X800 GT** won by a knockout, thanks to superior benchmark numbers and the fact that it has twice the memory of Leadtek's GeForce 6600 GT board. **Connect3D's 16-pipe 3028 X800XL** floated like a butterfly and stung like a bee as it took the welterweight class; it had MSI's 12-pipe NX6800 card up against the ropes as soon as it stepped into the ring.

We generally prefer performance over price, but **XFX's GeForce 6800GT** won the middleweight championship on points—100 points, to be exact: The card was selling for a hundred bucks less than Sapphire's only slightly faster Radeon X850 XT.

In hindsight, pitting ATI's top-of-the-line X850 XT Platinum Edition against nVidia's second-string GeForce 7800 GT was like putting the Maytag Repairman in the ring to face Mike Tyson; but hey, that was the best GPU ATI had to offer. Needless to say, **BFG's GeForce 7800 GT OC** won the heavyweight bout.

When the time came for the super-heavyweight match, we had no choice but to pit two cards powered by nVidia's top-of-the-line GeForce 7800 GTX against each other. PNY's Verto is an excellent value at $520, but **Asus' Extreme N7800** for $580 is the card we'd take into a dark alley. MPC

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Happy Birthday, Windows!

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THIS NOVEMBER MARKS WINDOWS' 20TH BIRTHDAY, AND WE'VE STOLEN MICROSOFT'S SCRAPBOOK—FROM BABY PICTURES TO ALL GROWN UP!

BY JASON COMPTON

In 1985, Microsoft launched a quaint little graphical shell for its command-line operating system called "Windows." Over the next decade, amid intense competition from the other personal computing contenders—the Mac, the Amiga, and Atari ST—Windows eventually clawed its way to the top of the OS heap. The early versions of Windows wouldn't have made any but the most generous of "Top 5 Operating System" lists, yet today, as Windows celebrates its 20th birthday, it's just about the only game in town, having defeated all comers.

From the humble beginnings of Windows 1.0 to the nadir of Windows ME to the hopefully bright future of Vista, it's all here. Is Windows' success a testament to a masterwork of design? A victory for canny market strategy? A Triumph of The Bill? A horrible historical error? Judge for yourself as we lead you through the improbable evolution of Windows, from shaky, uncertain beginnings to king of the desktop computing heap.

Special thanks to Nathan Lineback and Toastytech.com for screenshots of classic Windows versions!

PHOTOGRAPHY BY MARK MADEO

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Happy Birthday, Windows!

1985 to 1989

Microsoft Windows
Version 3.00a
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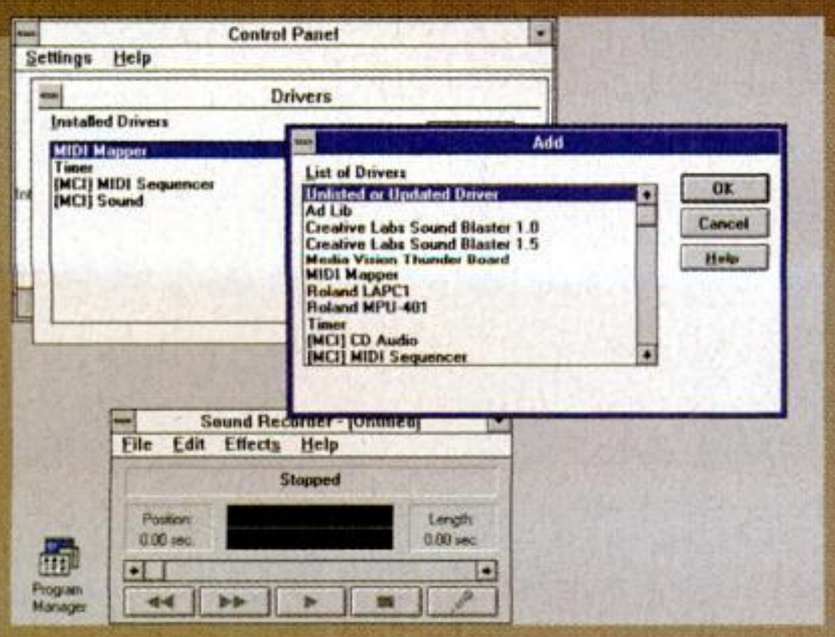
WINDOWS 1.X

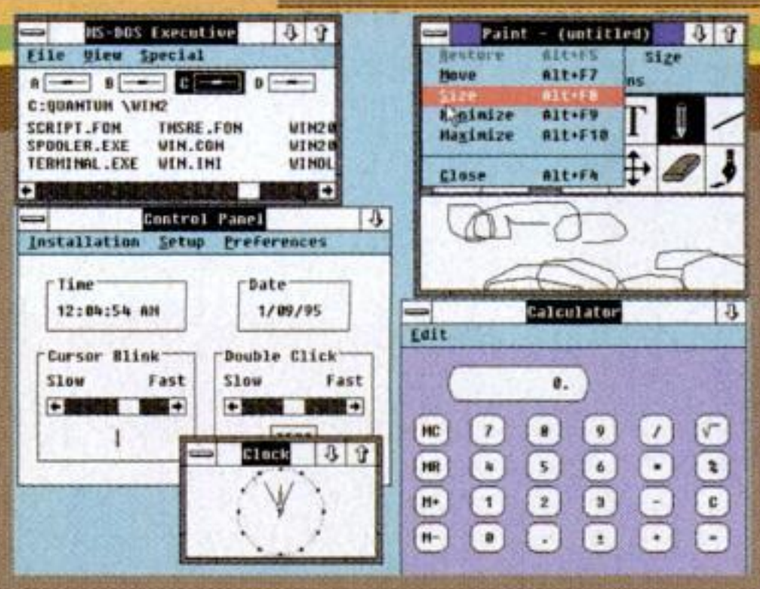
The face that today launches hundreds of millions of computers was downright fugly in the beginning. Launched from DOS, it provided graphical file management and some basic productivity tools, but third-party application support was virtually nonexistent. Application windows couldn't overlap, they could only be tiled (some pop-up windows and preferences would overlay on the main windows). Multiple applications could be opened in the Windows environment, but it wasn't the "multitasking" we use today. The "in focus" app, in which you were working, locked the CPU. Much of the core API hasn't changed since 1.01, however... with a little light hackery, Windows 1.x applications can be loaded in XP!



WINDOWS 3.1

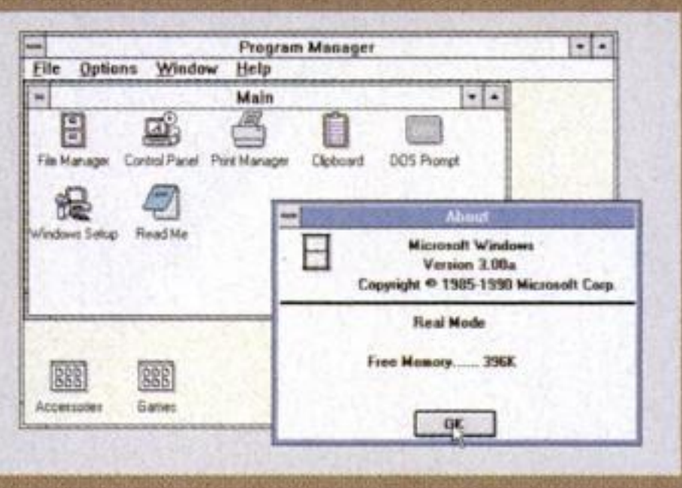
Windows' multitasking capabilities still weren't great, but in the 3.1 upgrade, they got better. Support for much more hardware meant that Windows would run on more computers. Burgeoning developer support and the hundreds of new apps that resulted made Windows 3.1 the first version Microsoft could get OEMs to package and preinstall on new computers. When users needed a GUI, they naturally turned to the one already sitting on their machine. Windows 3.1 also marks the first time Windows could use a paging file on the hard drive instead of system RAM.

WINDOWS 2.X (AKA WINDOWS/286, WINDOWS/386)



The visual foundation of Windows starts to take hold here, as the File Manager (back then known as MS-DOS Executive) is finally augmented by onscreen icons. Windows could overlap, and then the OS started to look like a real GUI. For the first time, application developers started to give Windows a serious look—even as the primary environment to develop programs in. The 386 version meant that Windows could finally run 32-bit code and address memory beyond the 640K DOS barrier, enabling more (and more interesting) applications to be run.

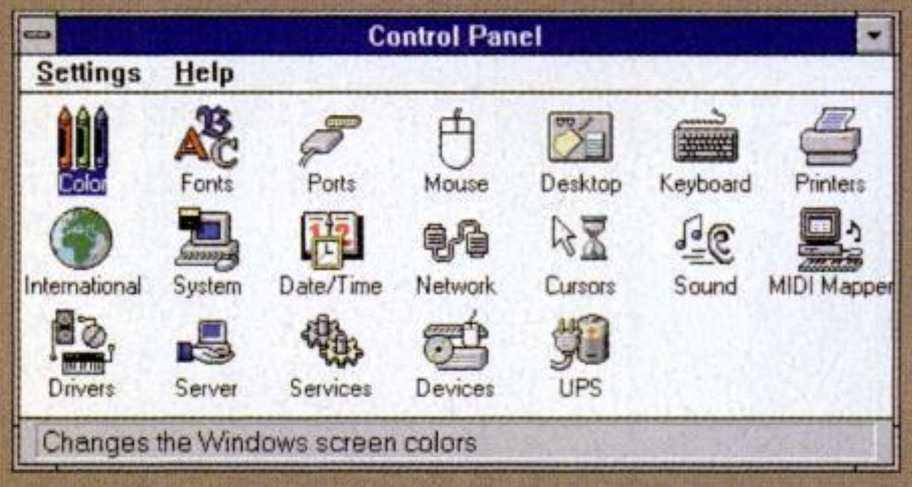
WINDOWS 3.0



By sloughing off the legacy of the 286's 16-bit architecture, Windows 3.0 was poised for success. Developers embraced the fully 32-bit platform: "It was a horrible mess to try to do anything before, when you had to always be aware of problems dealing with data larger than 64K," says Michael Geary, designer of Adobe *Type Manager* and a number of other Windows applications over the past 19 years. The introduction of the VxD driver system also made it possible to write more powerful Windows applications.

WINDOWS NT 3.1

Way back in 1988, Microsoft knew that running Windows on top of DOS was not feasible in the long term, so it began development of Windows NT. First released in July 1993, NT 3.1 looked like Windows 3.1 (right down to the still-befuddling Program Manager "superwindow"), but under the hood was a stable 32-bit native kernel, although support for some 16-bit Windows applications was still provided. During NT's development, Intel hadn't locked down the CPU market, so Microsoft developed versions of NT for other CPU architectures, most notably the DEC Alpha, which at the time was considered a serious rival to the Pentium for mainstream performance computing.



1985 | 1986 | 1987 | 1988 | 1989 | 1990

November 1985: Microsoft ships Windows 1.0

September 1987: Hilary Duff is born

December 1987: Microsoft releases Windows 2.0

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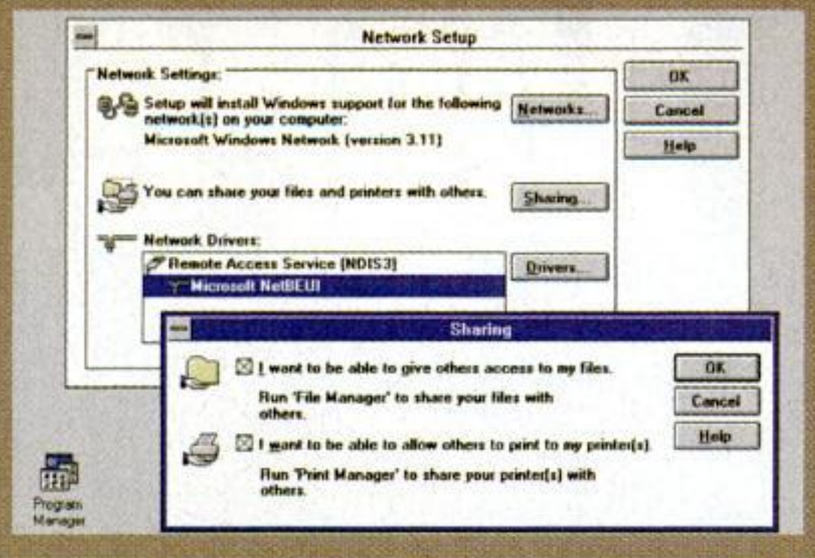
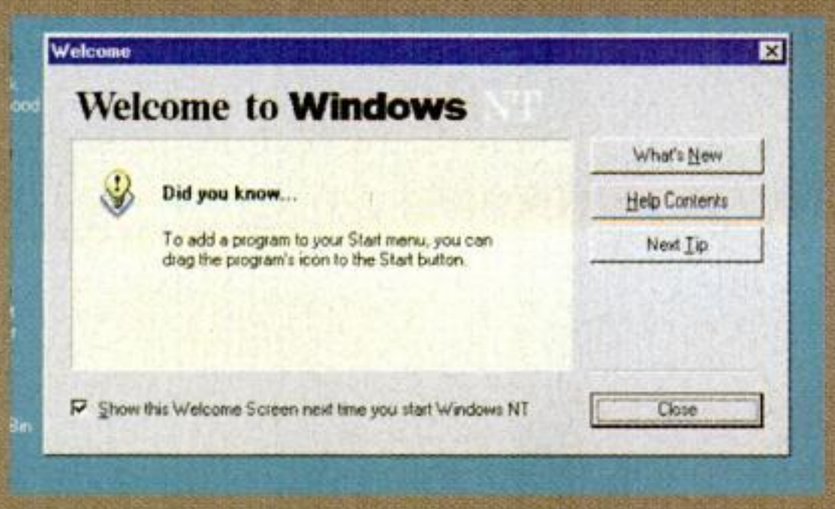
Happy Birthday, Windows!

1990 to 1994


Network Setup
Network Settings:
Setup will install Windows support for the following network(s) on your computer:
Microsoft Windows Network (version 3.11)
Networks...
OK
Cancel
Help
You can share your files and printers with others.
Sharing...
Network Drivers:
Remote Access Service (NDIS3)
Microsoft NetBEUI
Drivers...
Sharing
I want to be able to give others access to my files.
Run 'File Manager' to share your files with others.
I want to be able to allow others to print to my printer(s).
Run 'Print Manager' to share your printer(s) with others.
OK
Cancel
Help
Program Manager

WINDOWS FOR WORKGROUPS (3.11)

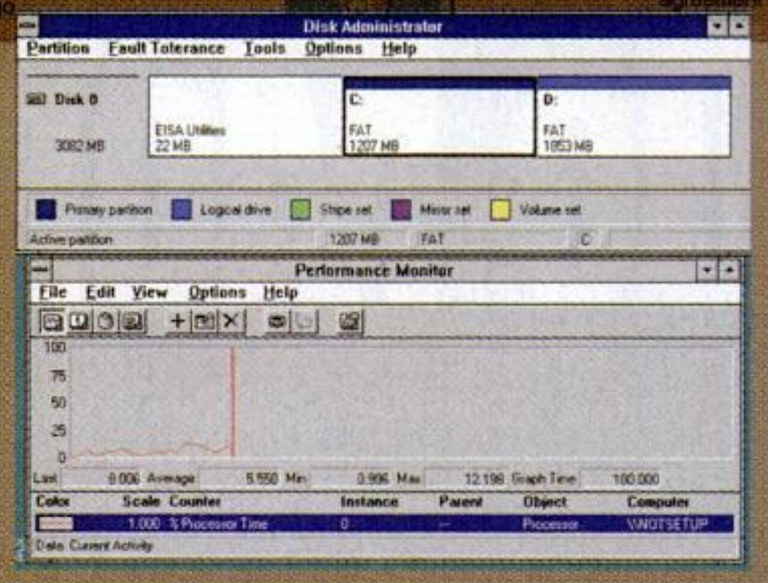
Microsoft did one better on Windows 3.1 with Windows for Workgroups, the first version of Windows to introduce relatively simple file and print sharing without the need for third-party software, cementing Windows as a true office operating system. Note WfW lacked native TCP/IP support, as the Internet (and it's native protocol) weren't of concern to the mass market yet. 286 support is totally cut off in this revision as more components of the OS are migrated to a dedicated 32-bit architecture. (No 386? No Windows for Workgroups for you!)


Welcome
Welcome to Windows NT
Did you know...
To add a program to your Start menu, you can drag the program's icon to the Start button.
What's New
Help Contents
Next Tip
Show this Welcome Screen next time you start Windows NT
Close

WINDOWS NT 4.0

NT 3.x was designed to look like Windows 3.x, but the Windows 95 graphical shell was actually designed first for NT—Windows 95 simply beat NT 4.0 to market, so NT 4 looks like the "copycat." This operating system was primarily intended for workstation use, although some opportunities for mirth and merriment were provided courtesy of DirectX 3. Hardware driver support, which had been a problem for NT since the beginning, continues with this version. Even though NT4 has the Win95 look and feel, the control panel remained a frightening place for novices—it's just one long list of operating system services, sans the handy and helpful Device Manager.

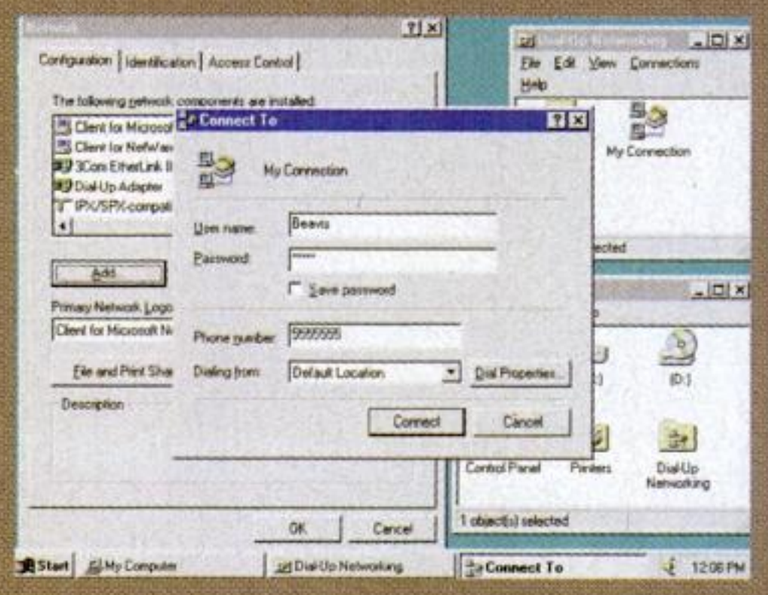
WINDOWS NT 3.51



Because of NT's hefty system requirements for a personal operating system (at a time when memory cost about $100 per MB, NT 3.5 required 12MB), NT 3.5's advances were overlooked by all but a select group of workstation users and server jockeys.

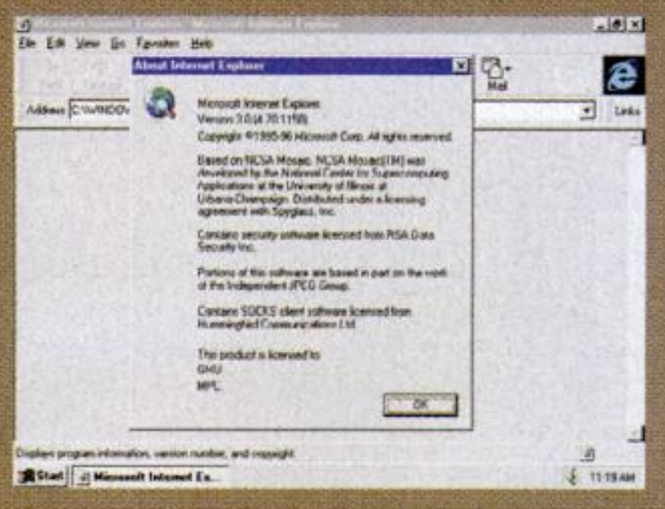
Some key components of XP's Administrative Tools—notably the disk partitioning tool and the performance monitor—were present in a form XP users would recognize as early as NT 3.5. Microsoft added support for the PowerPC in this version because Intel still didn't have a lock on the desktop CPU market.

WINDOWS 95



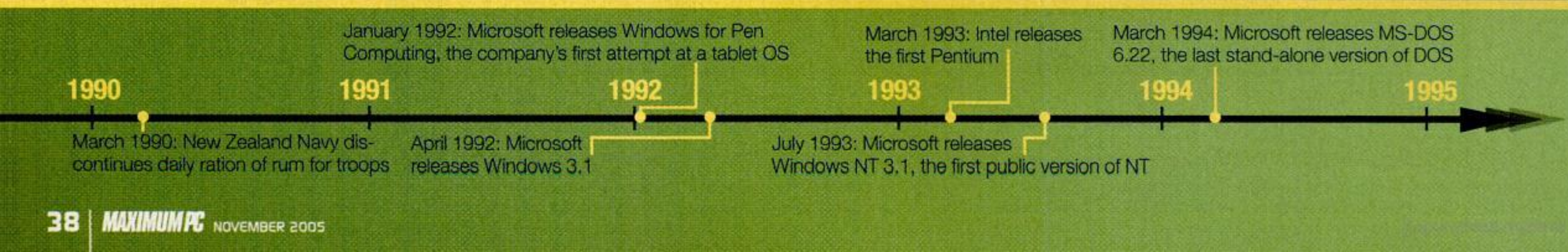
The promise of the first decade of development was finally fulfilled with Windows 95, which combined backward-compatibility with DOS and Windows 3.x applications with an icon-adorned Desktop, an application dock, and an integrated TCP/IP stack. At long last, the 8.3-character filename limit was gone. Plug-and-play hardware detection made its first appearance, but it didn't really work very well. Nevertheless, the Start menu and Taskbar finally exposed Windows' multitasking capabilities to all users, and the first modern version of Windows was born. After the DirectX gaming libraries were added to Win95, the OS replaced DOS as the premier PC gaming platform.

WINDOWS 95 OSR2



Before Service Packs, there were OSRs (OEM Service Releases), and OSR2 was the first time Microsoft had to scramble to catch up to the rest of the PC industry. The three key improvements in OSR2 were the introduction of the FAT32 filesystem (which finally enabled hard drive partitions of more than 2GB), *Internet Explorer 3.0,* and the first real attempt at USB support.

Nobody would mistake it for the basically painless plug-and-play of XP, but at least hot-plugging was a hypothetical possibility now for Win95 users. Unlike modern service packs, OSR2 was difficult to get unless you bought a new PC—as the name implies, it was up to PC builders to supply it to customers.


1990
1991
1992
1993
1994
1995
March 1990: New Zealand Navy discontinues daily ration of rum for troops
January 1992: Microsoft releases Windows for Pen Computing, the company's first attempt at a tablet OS
April 1992: Microsoft releases Windows 3.1
March 1993: Intel releases the first Pentium
July 1993: Microsoft releases Windows NT 3.1, the first public version of NT
March 1994: Microsoft releases MS-DOS 6.22, the last stand-alone version of DOS

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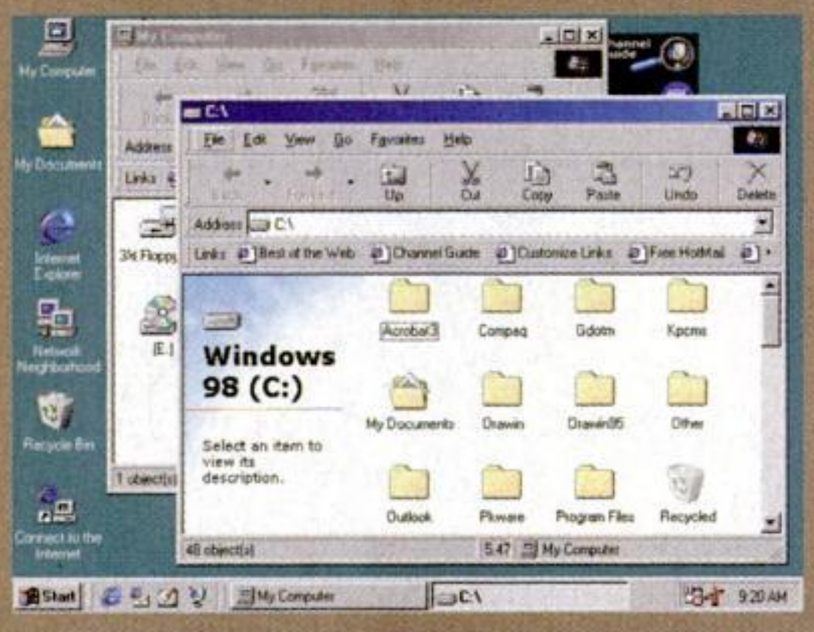
Happy Birthday, Windows!

1995 to 2005

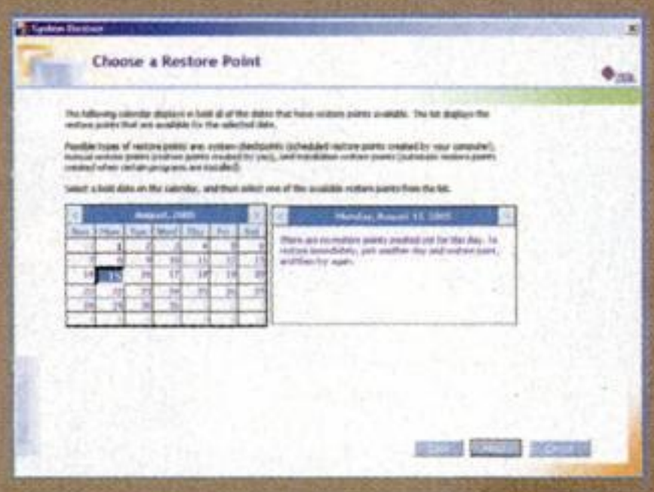


WINDOWS 98

The last great leap in DOS-based Windows, Win98 introduced the first working plug-and-play system, complete with stable USB support. Microsoft bundled and even partially integrated *Internet Explorer 4* into the OS. The ability to call on HTML, JavaScript, and ActiveX code from any app also aided software development. You could embed an IE window in just about any app. Windows 98 shipped with support for DirectX 5, cementing Windows' role as a gaming platform.

WINDOWS MILLENNIUM EDITION (ME)

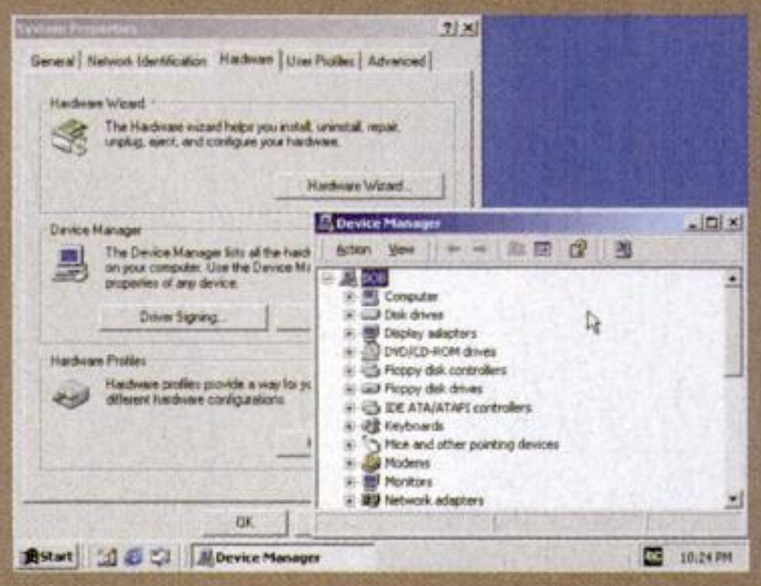
The less said about this dog, the better. Windows ME was an ill-conceived and ill-executed attempt to juice more life out of DOS-based Windows. In reality, ME did little but cause serious PC users to grind their teeth. DOS was still lurking in the wings, although MS went to so much trouble to hide it that some applications wouldn't work properly. *Windows Media Player* was tightly integrated with Windows in much the same way *Internet Explorer* was in Win98. The one high point of ME was System Restore, which would let you roll back a broken OS to a pre-saved restore point.



WINDOWS 98 SECOND EDITION

Despite its strengths, Windows 98 had serious stability problems out of the gate, so less than a year after its launch, the Second Edition arrived to replace it. Win98SE is generally considered the pinnacle of the DOS-based Windows implementation. Driver support continued to improve, including a virtual end to pesky IRQ conflicts. Internet Connection Sharing made Windows attractive to the budding broadband market. Win98SE became the de facto gamer's operating system as DirectX came of age and many game developers refused to support NT-based operating systems.

WINDOWS 2000



Win2000 represents the courtship of the super-stable NT kernel with the ease-of-use of Windows 98. Windows 2000 was the perfect practice run for Windows XP, it was the first real delivery of NT's promise—a more stable, more secure platform for Windows applications than DOS-based Windows could ever hope to be. Win98SE power users felt right at home running the OS, but Microsoft believed that Windows 2000 was still too resource-hungry and difficult to maintain for the home audience. As a result, Windows 2000 was targeted and priced for the corporate and workstation crowd.

WINDOWS XP

Ding dong the DOS is gone! With Windows XP, the NT kernel went prime time. Windows XP included a modest retrofit of the Win95 interface with Luna. The Luna interface made the machine even more accessible to new PC users by presenting commonly needed and used applications, such as the default web browser, in the Start Menu. WinXP made setting up multiple user accounts and workspaces simpler than it was in Windows 2000 (and more meaningful than it was in the low-security DOS versions). In late 2004, Service Pack 2 gave XP users a host of security upgrades, including a configurable OS firewall and OS-level hooks into most popular virus scanners.

1995

- May 1995: Microsoft launches Windows NT 3.51
- August 1995: Geeks stay up until midnight for Microsoft's release of Windows 95

1996

- September 1995: DirectX 1.0 released

1997

- August 1996: Microsoft releases Windows 95 OSR2
- August 1996: Microsoft releases Windows NT 4.0. NT now looks like Windows 95

1998

- June 1998: Microsoft releases Windows 98

1999

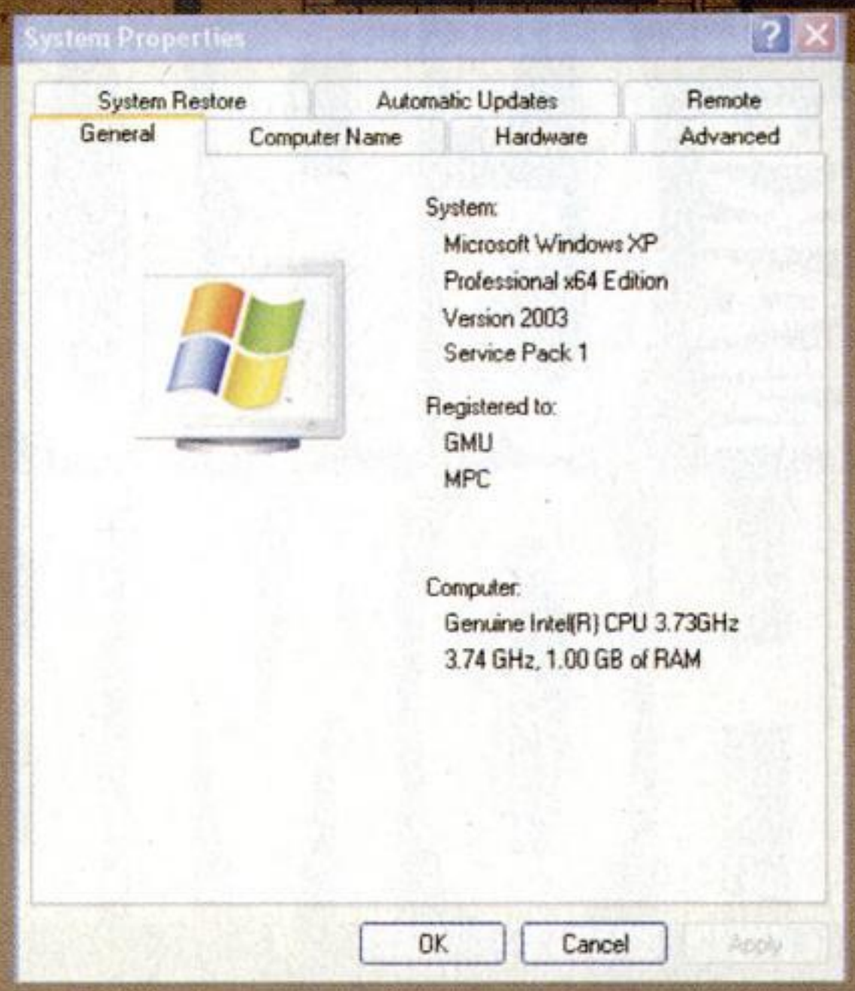
- May 1999: Microsoft releases Windows 98SE

2000

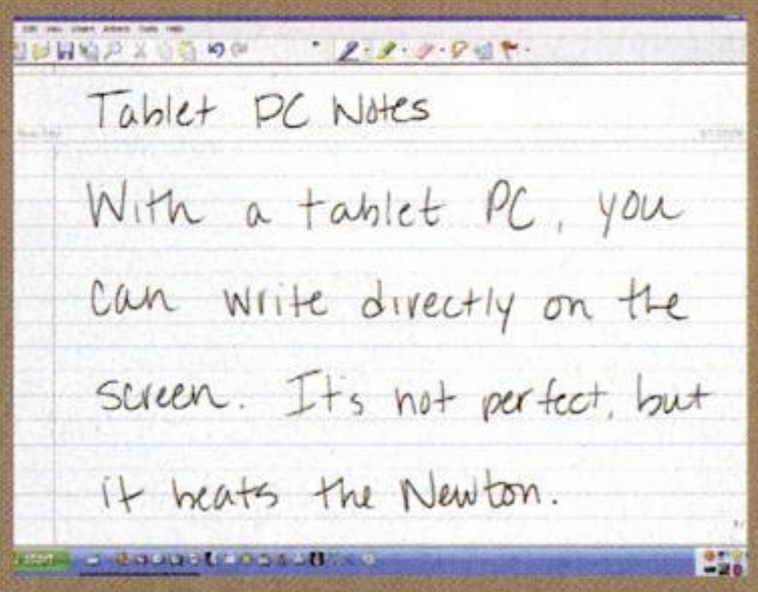
- December 1999: Y2K freak-out intensifies

WINDOWS XP MEDIA CENTER EDITION

The industry has been talking about "living room convergence PCs" for a decade, and Windows XP MCE represents Microsoft's incursion into that space. The XP desktop is still present, but MCE also includes a slick, TiVo-esque front-end for all the music and movies you can cram into a media machine—all driven by remote control. While the first versions had serious warts—fast-forwarding through a TV program could crash the shell—later revisions fixed many of the flaws. Still, MCE isn't as compelling as other products that aren't crippled by digital rights-management technology.



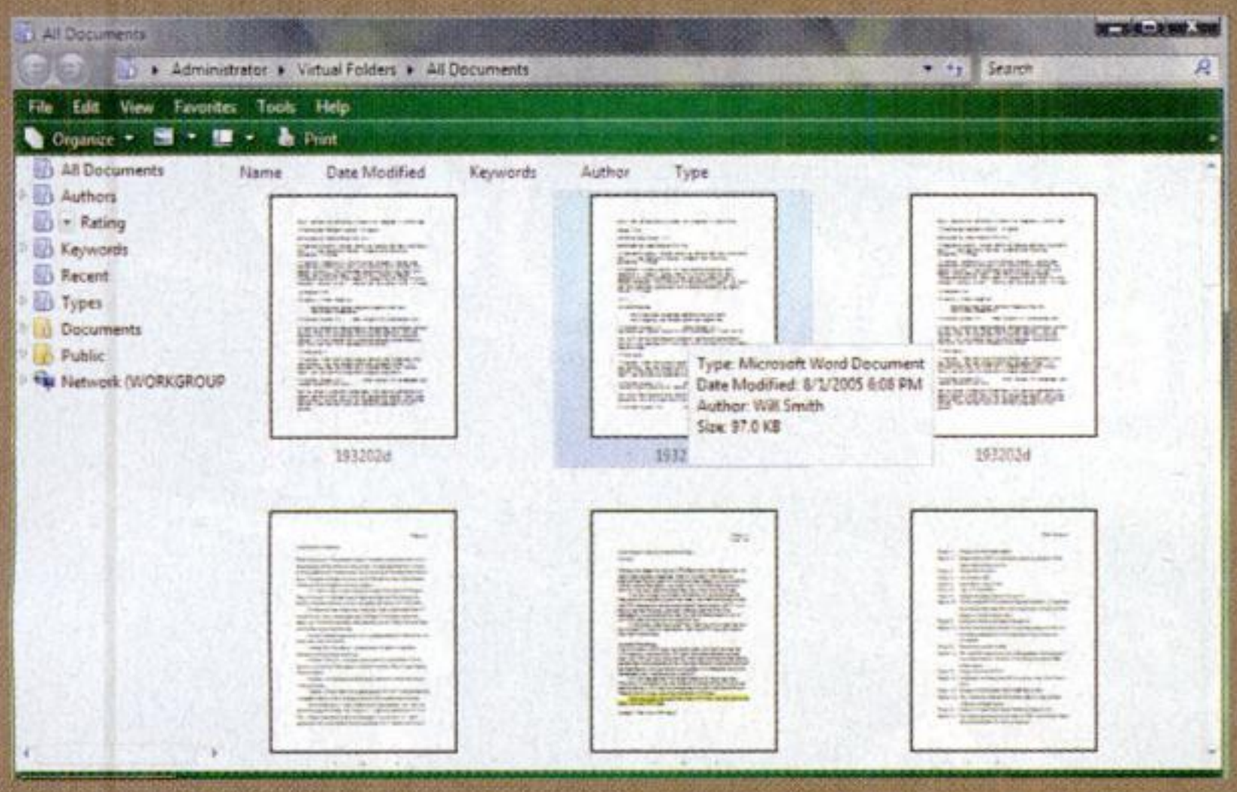
WINDOWS XP TABLET EDITION



Microsoft has tried to bring pen-based computing to the masses since the early 1990s, when a Windows 3.1-based pen-based OS was released. XP Tablet is a much more polished, ready-for-prime-time concept. Like MCE, Tablet is a full-fledged implementation of XP with extra bells and whistles, such as speech and handwriting recognition, as well as the Journal, an electric notepad that's perfect for taking notes.

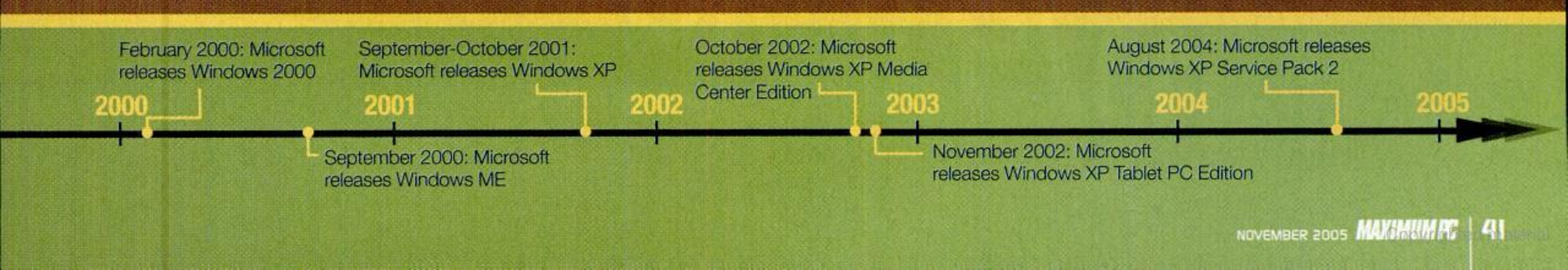
WINDOWS XP 64-BIT EDITION

Users who bought into Intel's and AMD's 64-bit architectures had to wait years for Microsoft to offer desktop OS support, but it finally arrived in 2005 in the form of XP 64-Bit Edition, the 64-bit offshoot of XP Professional. What that means remains to be seen, as 64-bit Windows has yet to provide a killer app. Although an official product, as of this writing 64-bit XP still has a specialized audience. A number of customary Windows features, including System Restore, are not present in the new OS. But to be on the cutting edge with the hottest iron, XP 64 is where it's at.



WINDOWS VISTA

Code-named Longhorn, Vista should be at least as much a leap in look and feel for XP users as Win95 was to the Win3.1 crowd. The new Aero interface emphasizes 3D interactivity and smooth, vector-based interface design, and the core of the operating system is built to tie in heavily with Microsoft's .NET framework, including a wave of new programming APIs (which are expected to be ported back to XP users as well.) If you think Longhorn/Vista is taking a long time to reach the market, consider that it took Microsoft well over a decade to make NT its primary desktop operating system. Surely, an extra year or two for Vista won't hurt anybody... MPC


2000
February 2000: Microsoft releases Windows 2000
2001
September 2000: Microsoft releases Windows ME
September-October 2001: Microsoft releases Windows XP
2002
October 2002: Microsoft releases Windows XP Media Center Edition
2003
November 2002: Microsoft releases Windows XP Tablet PC Edition
2004
August 2004: Microsoft releases Windows XP Service Pack 2
2005

MAKE A GROOVY HOME MOVIE

FROM BLAND TO GRAND: MAXIMUM PC WALKS YOU THROUGH THE ESSENTIALS OF EDITING DIGITAL VIDEO

BY JOHN BUECHLER

Einstein taught us that time isn't absolute, but relative to the observer. If you don't know what he meant, try sitting through your neighbor's home movie of little Gretchen's first swimming lesson. Chances are, minutes will seem like hours, and hours will feel like days.

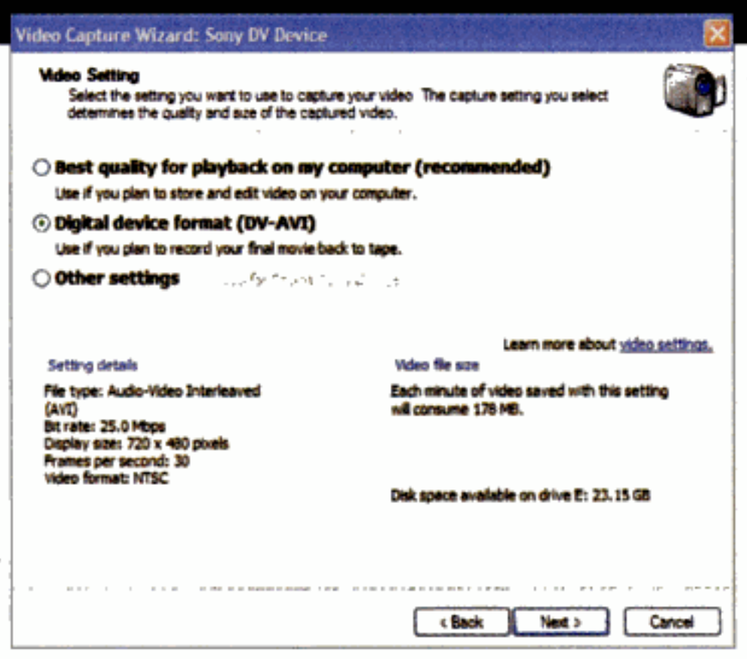
That's the result of unedited footage, which has the power to turn even the most festive gathering into a cruel wax museum of forced smiles. During the barbaric reign of 8mm film, the only way to edit your home movies was with a razor and tape, but the digital era has changed all that. With a fairly robust PC and Windows XP, you've got a full-fledged post-production studio at your fingertips.

Though many folks regard trimming the fat from their beloved memories as sacrilege, thoughtfully editing your video adds much more than it takes away. By snipping idle shots of Aunt Juanita chain smoking her Lucky Strikes, the focus remains on Gretch's first dog paddle in the wading pool. You have the freedom to cut to the beaming smiles of proud parents, add background narration and music, and even manipulate time by showing her progress over a period of months or years until she falls in with the wrong crowd and ends up as a sideshow racer.

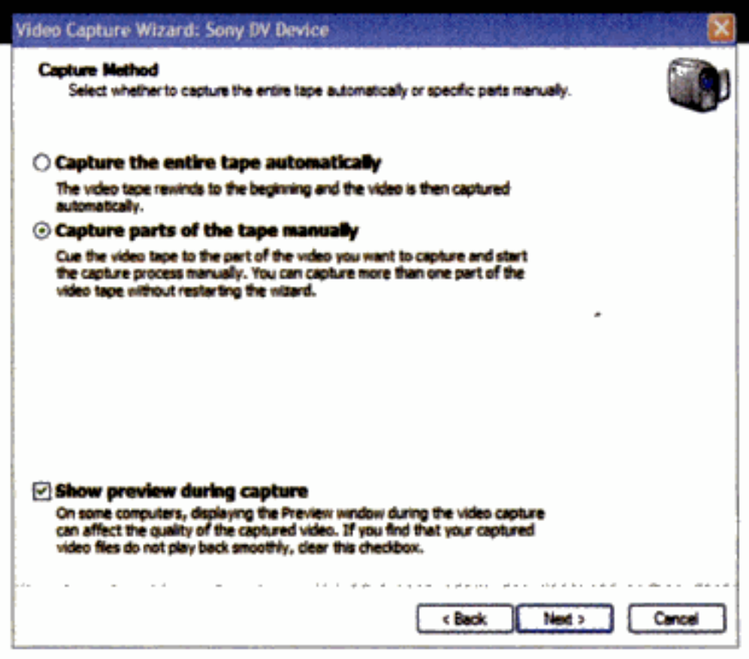
It's true that even simple video editing applications can be daunting to the neophyte. But once you've grasped the basics in one application, you can apply those lessons to any app! You'll find that editing your videos can be as easy as making a mix CD for your friends. And we're going to prove it. Just look over our shoulder as we walk you through the process of taking raw footage and turning it into a professional-looking movie using *Windows Movie Maker 2*, which is a standard component of Windows XP. Before you know it, you'll be improvising with your own footage, and spending next January hobnobbing with Parker Posey at the Sundance Film Festival.

STAGE 1: PUT YOUR CAMERA TO WORK

We gathered the footage for this tutorial at a wedding party; but you can use whatever footage you have around. We shot with two cameras, which gives us tons of footage to choose from when we start cutting. We mounted our digital camcorder on a tripod aimed at the relatively bright stage, turned it on and left it alone to capture the band and the full audio track. We used Sony's analog Hi8 TRV615 camcorder to move around the darker dance floor, capturing select scenes from the party.


Video Capture Wizard: Sony DV Device
Video Setting
Select the setting you want to use to capture your video. The capture setting you select determines the quality and size of the captured video.
Best quality for playback on my computer (recommended)
Use if you plan to store and edit video on your computer.
Digital device format (DV-AVI)
Use if you plan to record your final movie back to tape.
Other settings
Learn more about video settings.
Setting details
File type: Audio-Video Interleaved (AVI)
Bit rate: 25.0 Mbps
Display size: 720 x 480 pixels
Frames per second: 30
Video format: NTSC
Video file size
Each minute of video saved with this setting will consume 178 MB.
Disk space available on drive E: 23.15 GB
< Back
Next >
Cancel

Select a quality setting for your imported footage. We want a versatile AVI file, so we're opting for the DV-AVI setting.


Video Capture Wizard: Sony DV Device
Capture Method
Select whether to capture the entire tape automatically or specific parts manually.
Capture the entire tape automatically
The video tape rewinds to the beginning and the video is then captured automatically.
Capture parts of the tape manually
Cue the video tape to the part of the video you want to capture and start the capture process manually. You can capture more than one part of the video tape without restarting the wizard.
Show preview during capture
On some computers, displaying the Preview window during the video capture can affect the quality of the captured video. If you find that your captured video files do not play back smoothly, clear this checkbox.
< Back
Next >
Cancel

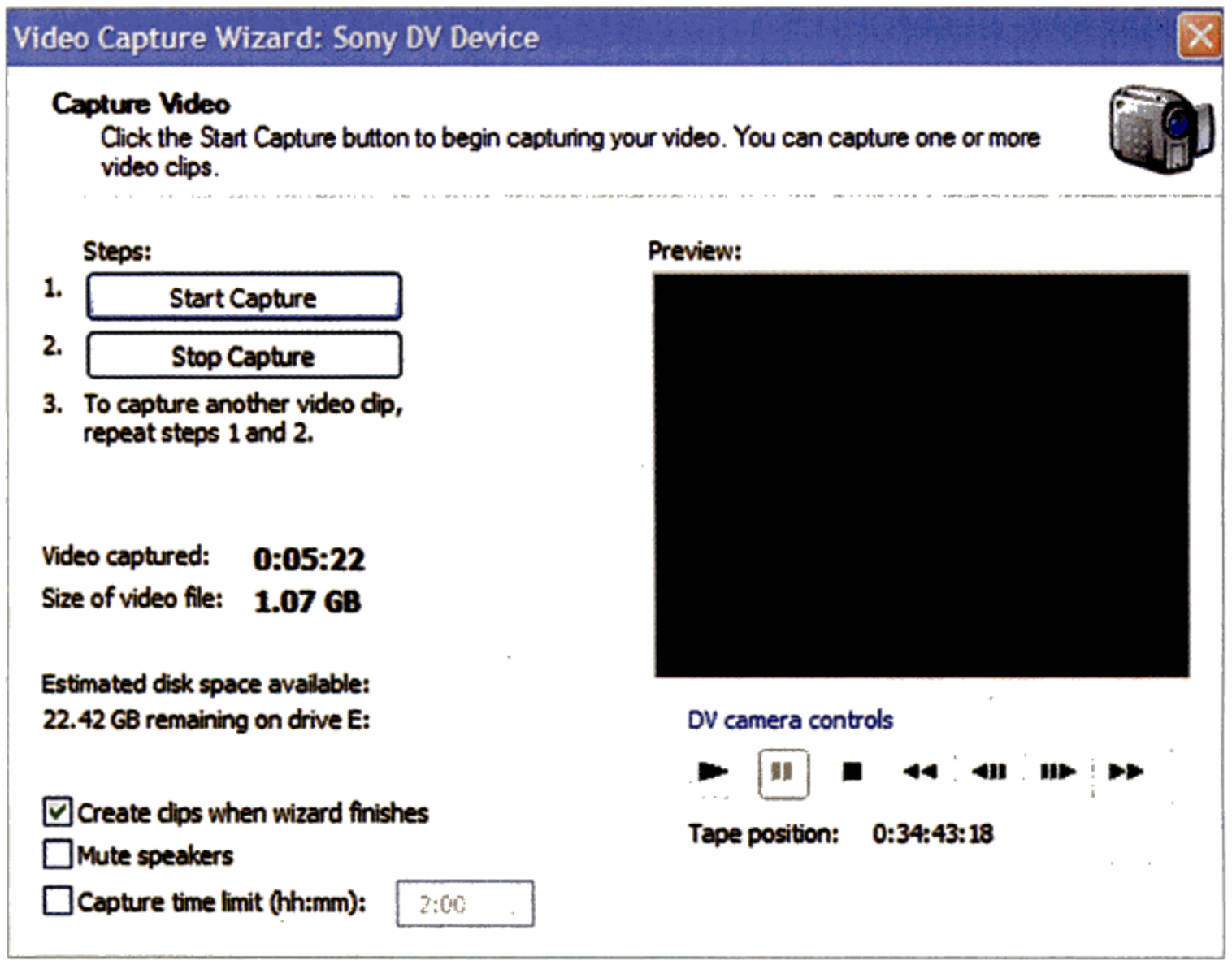
To capture only a portion of your footage, select "Capture parts of the tape manually."

STAGE 2: TRANSFER THE FOOTAGE TO YOUR PC

Getting digital camcorder footage into *Movie Maker 2* is simple. Connect your DV camera to your PC via FireWire or USB (whichever your camera supports), turn on the camcorder, and switch it to the VCR or VTR mode. When *MM2* recognizes the camcorder, it will walk you through a wizard that helps you transfer the footage to your hard drive. *MM2* has an option to automatically split the file into clips as it imports your footage, but we want more control over the cuts, so we're going to import the footage from each camera as a single clip and manually split it later.

Getting analog camcorder footage is a bit more complicated. You can use an analog capture device like Plextor's ConvertX PX-M402U ($160, **www.plextor.com**), or you can dub the analog footage onto a digital camcorder tape by connecting the two camcorders using RCA and S-video cables. Note that DV-AVI files are humongous—an hour of video takes up about 13GB of hard drive space—so make sure you've got the room before you initiate the transfer.

Now that our footage has been added to the asset collection, we're going to check it for quality. *MM2* is an entry-level video editing application, and though it's sufficient for casual editing, it lacks some features found in high-end video editing applications, such as providing automatic feedback about frames that are dropped during the capture process. Dropped frames are typically indicative of computer issues, such as a fragmented or slow hard drive, or a PC in dire need of a tune-up. We'll use *MM2's* Preview Monitor to view the imported file and check for missing frames or audio glitches.

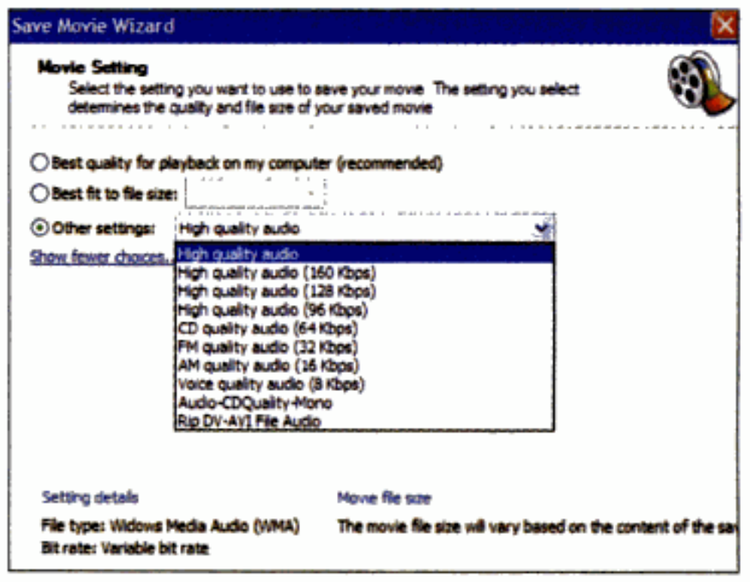

Video Capture Wizard: Sony DV Device
Capture Video
Click the Start Capture button to begin capturing your video. You can capture one or more video clips.
Steps:
1. Start Capture
2. Stop Capture
3. To capture another video clip, repeat steps 1 and 2.
Video captured: 0:05:22
Size of video file: 1.07 GB
Estimated disk space available:
22.42 GB remaining on drive E:
Create clips when wizard finishes
Mute speakers
Capture time limit (hh:mm): 2:00
Preview:
DV camera controls
Tape position: 0:34:43:18

If you want to skip portions of your recorded footage, you can use *MM2's* Preview Monitor to control the DV camera from your PC.

STAGE 3: RIP THE AUDIO TRACK FROM THE VIDEO FILE

Now we need to extract the audio track from our DV camera. Audio plays a major role in the editing process. You'll be trimming video clips, discarding some, moving or overlapping others, and bringing in new ones, and everything must be kept in sync with the audio. The easiest method for our purposes is to simply put a second copy of our band footage on the Audio/Music track—*MM2* will treat it as if it were audio-only.

We wanted to make the band footage a simple WMA file for a less cluttered but easier to manage timeline. To do this, we opened a new *MM2* project, dropped our video in the Audio/Music portion of the timeline, and then selected File > Save as Movie. *MM2* recognizes that the proj-


Save Movie Wizard
Movie Setting
Select the setting you want to use to save your movie. The setting you select determines the quality and file size of your saved movie
Best quality for playback on my computer (recommended)
Best fit to file size:
Other settings: High quality audio
Show fewer choices
High quality audio
High quality audio (160 Kbps)
High quality audio (128 Kbps)
High quality audio (96 Kbps)
CD quality audio (64 Kbps)
FM quality audio (32 Kbps)
AM quality audio (16 Kbps)
Voice quality audio (8 Kbps)
Audio-CDQuality-Mono
Rip DV-AVI File Audio
Setting details
File type: Widows Media Audio (WMA)
Bit rate: Variable bit rate
Movie file size
The movie file size will vary based on the content of the sa

To extract the audio track from a movie, drag that movie to the Audio/Music track in *Movie Maker,* then use the export function to save the audio in WMA format at the bit rate of your choice.

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Microsoft game studios

LIONHEAD STUDIOS

XBOX

Games for Windows Microsoft Windows XP

FABLE

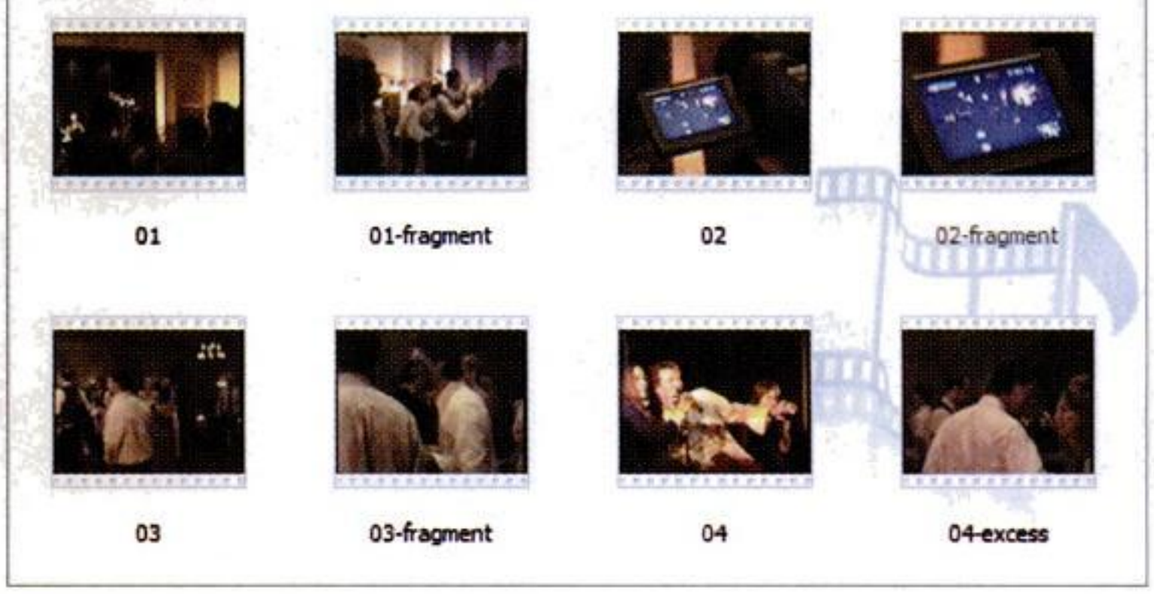
THE LOST CHAPTERS

MATURE 17+ M CONTENT RATED BY ESRB

Blood
Sexual Themes
Strong Language
Violence

FOR EVERY CHOICE, A CONSEQUENCE. Will you be a noble warrior, a fearsome villain, or something in between? Fable: The Lost Chapters broadens the RPG adventure and the possibilities of the award-winning original, for both Microsoft Windows XP and Xbox. More lands to explore, more journeys to take, more lives to be lived. Look deep into yourself, and discover what you might become. www.microsoft.com/games/fable

Once you've picked your clips, you can start editing your movie!



Here are the analog clips in Thumbnail view after first-pass splitting.

ect only contains audio, and allows us to export the clip as a WMA file.

STAGE 4: ADD STOCK FOOTAGE FOR SPICE

A few well-placed stock clips can add zest to any project, especially in the opening and closing scenes. You can do a Google search for royalty-free video clips, or import still photographs to use as segues between clips or to fill space on the video track to maintain audio sync. You can also use a solid black image (created in *Paint*) to fill space on the video track as needed to maintain audio sync (by stretching it in the timeline to the proper duration); this can always be replaced later with clips and images. We bookended our movie with colorful clips at the beginning and end of the video.

Drop the clip or picture onto the timeline, grab it by the trim handle and stretch it to the duration you desire. Note that *MM2* doesn't allow gaps in the video track of the timeline: Clips automatically "snug up" to the adjoining clip on the left if you delete one.

Now that we've got all our clips in a row, we're ready to do some serious editing.

STAGE 5: ORGANIZE YOUR FOOTAGE

Having skipped automatic clip-splitting during the capture process, we're going to make our first manual pass at it in the collection. There are a few reasons to split clips in the collection area instead of in the timeline. You can rename a clip in a collection but you can't on the timeline, and descriptive names are easier to work with later than "Clip 1" or "Clip 2." For synching the visual/audio in the project, it helps to know the exact location of the clip in the bigger, original file it came from, and the "clip properties" data in the collection includes this information. On the timeline, the same clip's properties change to show just its location on the timeline.

Manually selecting your clips provides you with an opportunity to spend quality time with your video, getting to know each clip individually. Some you'll love, some you'll like, but others you'll cringe at, and they can be dispatched now. Remember, for every minute of footage in your final movie, there should be four (or more) left on the editing room floor.

Because we used two sources, we're creating two new collections, "Analog Clips" and "Digital Clips," and copying the two original source clips into them to prevent confusion as we begin to divide the footage. You can name your collections anything you want though, especially if you have multiple cameras. Keeping your collection of clips organized will make it much easier for you to find just the shot you're looking for when you're editing.

Split Like an Expert

- **Look for changes in visual or audio content—places where splitting is logical. Remove any fast pans or zooms (such as when a camcorder is left running when quickly moving from one scene to the next). Another easy split point is someone walking in front of the camera as it was shooting something else.**
- **Look for poor footage to discard. Out-of-focus frames are obvious candidates.**
- **As you split, rename the clips. Be descriptive and include an assessment or rating. Note your gut-level decision to keep versus scrap. If you subscribe to the 80/20 rule, look to scrap the 80 percent, not the 20 percent.**
- **Tag the clips to discard but don't delete them yet. If it's someone walking past the camera, split it when he's in the middle of the frame. Don't split it before he walks in front, and after he walks in front. You don't want a clip of some dude walking from one side of the screen to the other. You can easily trim the clips in the timeline to remove him from view, and those extra frames on the good clips always come in handy when you rethink trim points.**

STAGE 6: SPLIT YOUR CLIPS

We recommend you make a couple of passes at splitting your raw footage into clips that are interesting. On the first pass, concentrate on excising the footage you don't want to include. You can safely remove all those lovely shots of the floor, the too-fast pans, and the jittery, *Blair Witch*-style running-through-the-woods shots. That should take care of the vast majority of the junk footage you shot. Be sure to leave plenty of the background footage you shot for your b-roll. When you assemble your film, you'll use the b-roll to fill in gaps between cuts, set up a scene, and give context to your film. Make sure you give your clips descriptive names,

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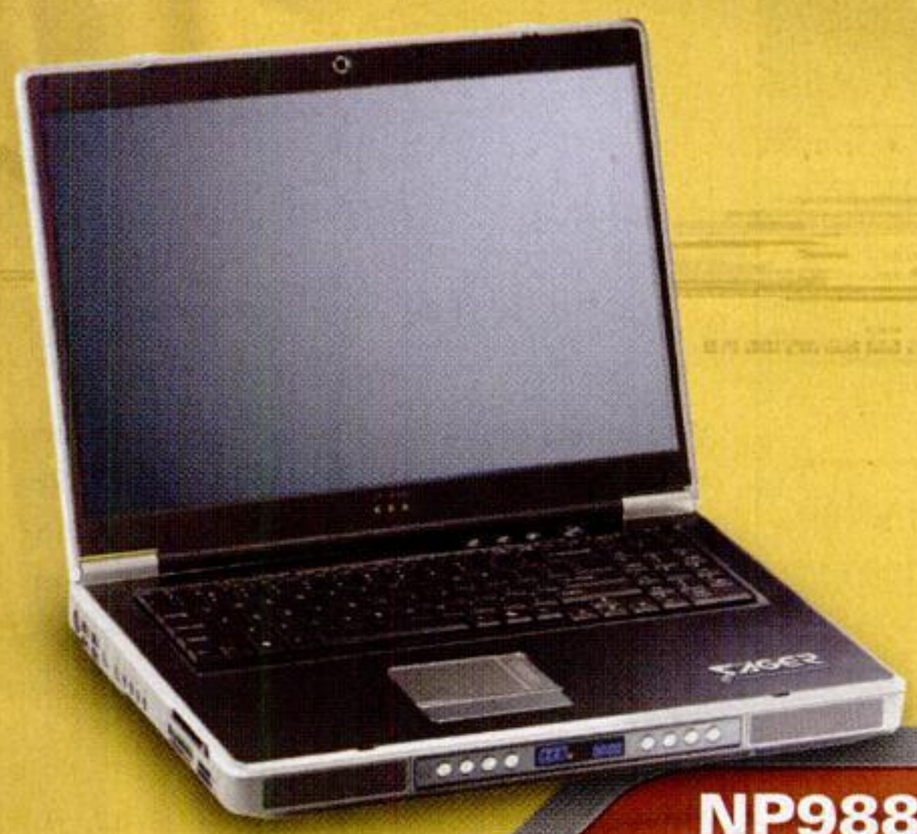

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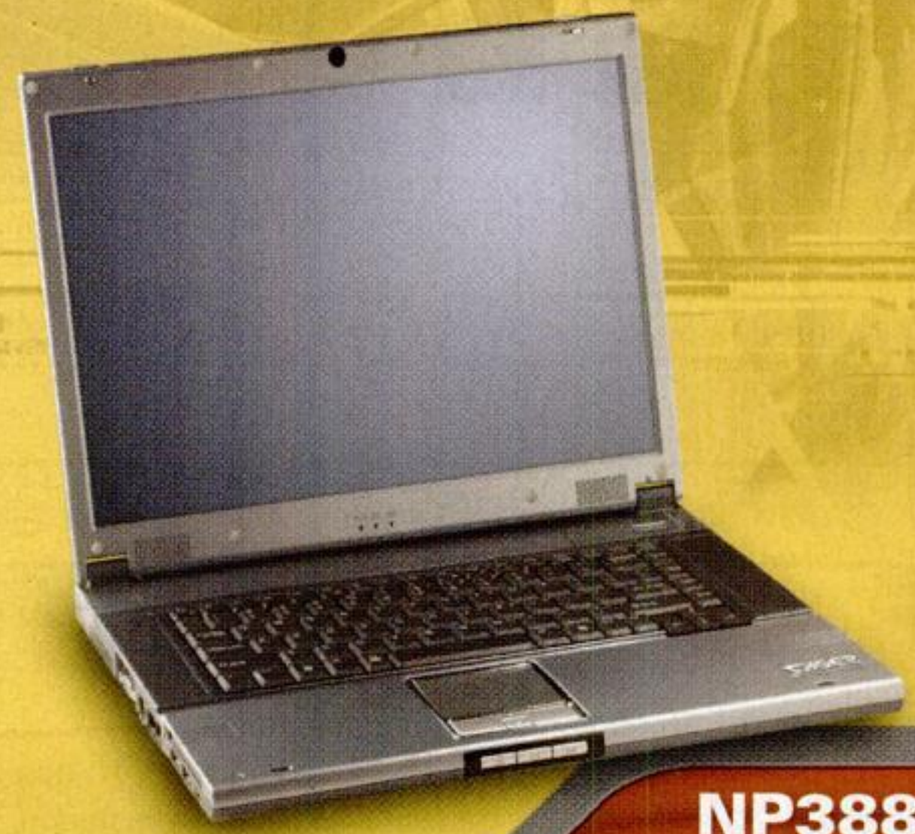

NP3880

FEATURES

- Dual Channel DDR2 System Memory supports 400/533MHz, provides the best match for Intel® Processors and enables power efficiencies for data intensive business, multimedia, and gaming applications.
- nVIDIA® GeForce™ Go 7800 GTX PCI-Express™ Graphics Module[5] with 256MB DDR3 Memory delivers true-to-life graphics at blazing speeds.
- The front panel Audio DJ CD player control with separate power switch lets you play your favorite music CD or MP3 while on the go.
- Dual Optical Device bays and Dual Hard Disk Capability allow this system to be customized with 2 CD-ROM devices and 2 Hard Drives coexisting for maximum storage capacity.

OPTIONS

- 802.11g Wireless Module
- 802.11g and Bluetooth Combo Module
- TV Tuner with Remote

NP9880C $2395

- 17.0" Wide Viewing Angles WSXGA+ Active Matrix Display with Super Clear Glare Type Screen
- Intel® Pentium®4 Processor 630 with HT Technology (2MB L2 Cache, 3.0GHz, 800MHz FSB)
- 256MB DDR3 nVIDIA® GeForce™ Go 7800 GTX PCI-Express™ Graphics
- 512MB Dual Channel DDR2 SDRAM at 533MHz
- 60.0GB 5400RPM Ultra ATA100 Hard Drive
- 8X DVD[2]/24X10X24 CD-RW[3] Combo Drive
- Full Size Keyboard with Numeric Keypad
- Front Panel Audio DJ with Separate Power Switch
- Hardware Raid 0,1 Function
- Built-In Digital Video Camera
- Built-In 7-in-1 Card Reader
- 4 Built-In Speakers with a Subwoofer
- External USB 1.44MB Floppy Disk Drive
- Integrated Fax Modem[4] and 10/100/1000 Ethernet
- Microsoft® Windows® XP Home Edition
- Sager's Umbrella Protection Policy

FEATURES

- nVIDIA® GeForce™ Go 6600 PCI-Express™ Graphics with 128MB DDR Memory delivers best-in-class performance and brilliant video for gaming and multimedia business applications.
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OPTIONS

- Bluetooth Module
- Port Replicator

NP3880C $1445

- 15.4" WSXGA+ Active Matrix Display
- Intel® Centrino™ mobile technology
  – Intel® Pentium® M Processor 740 (2MB L2 Cache, 1.73GHz, 533MHz FSB)
  – Intel® PRO/Wireless 2915ABG LAN 802.11a/b/g
- 128MB DDR nVIDIA® GeForce™ Go 6600 PCI-Express™ Graphics
- 512MB Dual Channel DDR2 SDRAM at 533MHz
- 40.0GB 5400RPM Ultra ATA100 Hard Drive
- 8X DVD[2]/24X10X24 CD-RW[3] Combo Drive
- Built-In Digital Video Camera
- On-Board 56K V.90 Modem[4] and 10/100/1000 Ethernet
- Built-In 4-in-1 Card Reader
- 4 Built-In Stereo Speakers
- Virtual 6 Channel External Speaker Output
- 3D Enhanced Sound (S/PDIF Output for DVD)
- Microsoft® Windows® XP Home Edition
- Weight: 7.9 lbs with Battery
- Sager's Umbrella Protection Policy

intel inside
pentium® 4
HT

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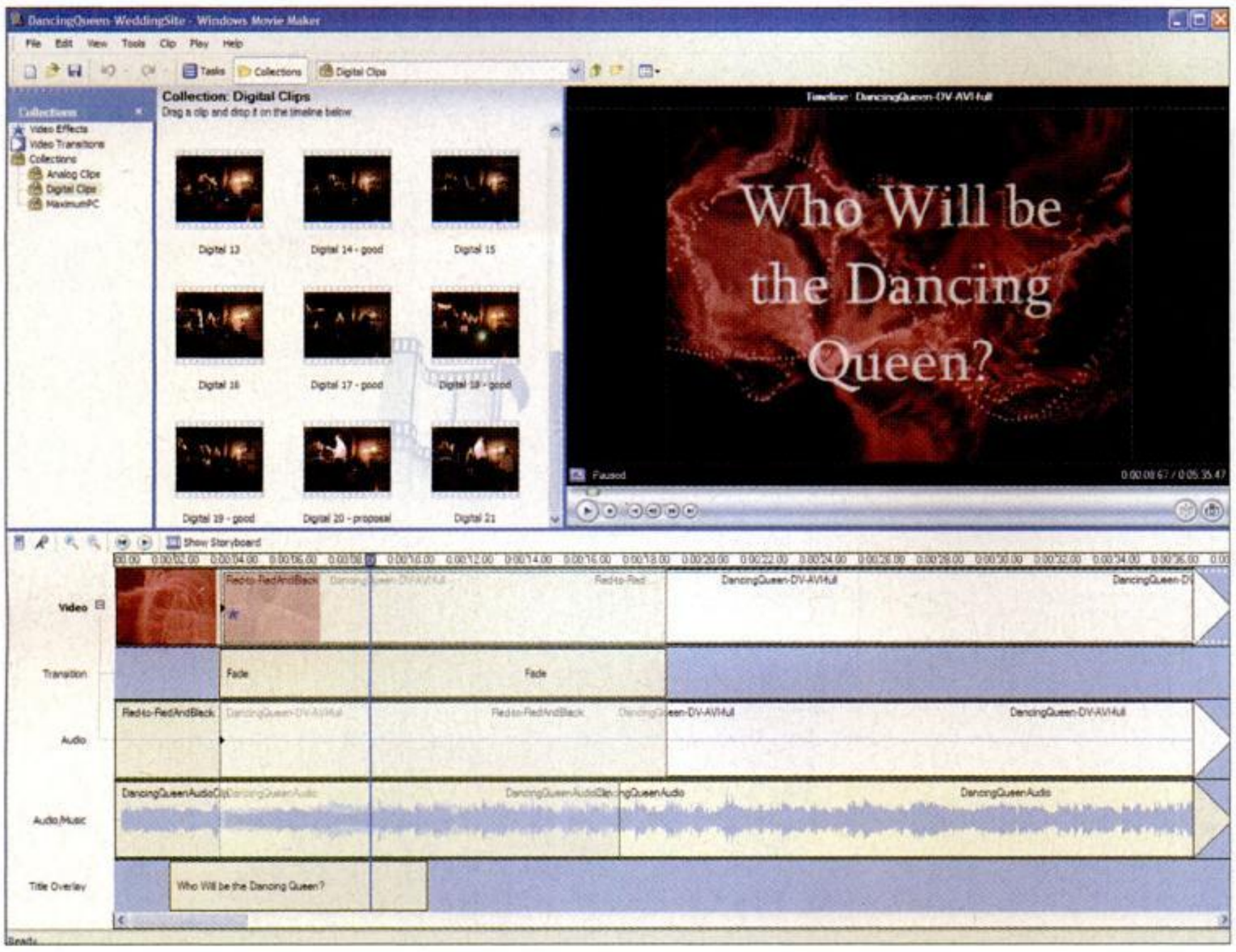


A close-up view of the timeline during project editing.

When you move from b-roll to a conversation, you should adjust the audio balance from the background audio to the audio from your camera, and then back to the background when the shot changes again.

so you'll be able to identify them without having to view the entire clip.

Now that you've trimmed the film fat, you'll want to be more aggressive, and go through and split your clips into individual scenes. You should split clips where the camera was stopped and restarted. Replacing those herky-jerky camera-on/off transitions with smooth transitions will make your video much more viewable. You can also split clips at natural transitions: the end of a conversation, for instance. When you're cutting individual scenes, make sure you leave a few seconds of cushion on either end of the clip. You never know when you'll need those seconds. In addition to naming the clips, we make a list of all our clips, with the exact start and stop times from the original footage. That makes synching the audio from your soundtrack with your video clips a snap later on.

If you shot with multiple cameras, you should create clips of the same scene from all of your cameras at the same time. By using footage from both cameras, you can fill in gaps that would be present if you used only one cam.

Do the second-pass splitting aggressively *and* artistically. Get in touch with the tempo and rhythm of the footage and the music, and remember that you're not cutting the video for your use, you're cutting it for your viewers!

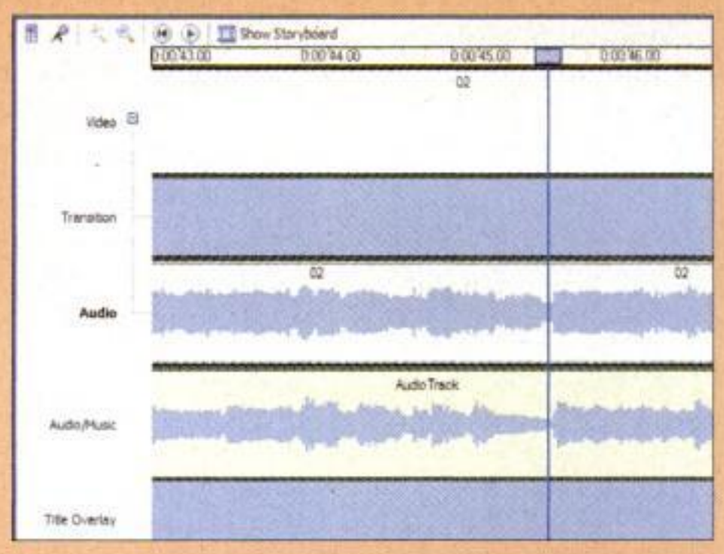
Once you've chopped up your clips, you can move on to the next step and place the clips in your project timeline.

This is a great time to backup your collection of clips to optical disc or a second hard drive. You've spent a lot of time making the cuts, and it would suck to lose them if a drive failed.

Synchronizing Audio and Video

Getting your clips synched with the background audio track can be really tricky, but the effort is worthwhile. Nothing looks as impressive as a video that seamlessly transitions from background music to conversation and back again.

The easiest way to synch your video and audio tracks is to line up the wave patterns in the top and bottom of the timeline. Even when you're using an audio track from a different camera, you'll notice that the basic sound wave is shaped the same, with peaks and valleys at the same places. Move the video clip until the audio sections are perfectly aligned, as shown in the image here.



You can actually line up the waveforms from your background soundtrack with the video clips to sync the video and background audio perfectly.

STAGE 7: PUT IT ALL TOGETHER

All home videos have nostalgic value, but as we said before, what elevates your footage to something universally enjoyable is good editing. Here's how we arranged our final film—don't be afraid to experiment as you do yours.

With the audio track in place (Step 3), we selected and moved all of our clips, including the b-roll, into our project timeline. They're easy to sync with the audio because we knew their exact starting positions, and we have the black filler image to fill in any empty spaces. We selected clips so there would be a good mix

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An overview of our finished project. We added a few transitions and credits, but stayed away from anything that would call too much attention from our subjects.

Save Movie Wizard
Movie Location
Where do you want to save your movie to?
My computer
Save your movie for playback on your computer.
Recordable CD
Save your movie for copying to a recordable CD.
E-mail
Save and send your movie as an e-mail attachment by using your default e-mail program.
The Web
Save and send your movie to a video hosting provider on the Web for others to watch.
DV camera
Record your movie to a tape in your DV camera for playback on the camera or to watch o...

Choose the destination for your video; you can put it on your Desktop or a backup drive.

of actual content and b-roll. For our wedding video we used footage of the band interspersed with video of the dancers.

Editing a home movie is like assembling a jigsaw puzzle that you lost the box lid for. You've got no idea what the final project looks like, but you'll know it when you see it. The best way to learn is to jump right in and start experimenting.

When you add new clips, make sure you get the audio and video synched. Even the slightest disconnect between the movement of people's lips and the audio of their voices will jar viewers and make your movie look bad. We move from left to right along the timeline, overlapping footage where necessary and trimming as we go. Make sure you re-establish the sync after you put each new clip in place. In *Movie Maker 2,* overlapping two clips in the timeline creates a basic fade transition that you can keep or replace later with a different one.

STAGE 8: ADD SPECIAL EFFECTS AND FANCY TRANSITIONS

Before you get carried away with all the crazy transitions that *Movie Maker 2* offers, remember, star wipes haven't been cool since 1977. Usually a simple (and quick) fade to black is preferable to the fancy sweeps and fades that many amateurs use. Adding special effects judiciously, however, can add drama and excitement to a dull moment in your film.

After previewing the complete project a number of times, you should experiment with a few special effects. To apply an effect, just drag it from the collection of Video Effects and drop it onto the selected clip. Up to six of the same or different effects can be added to a clip, but we wouldn't recommend using more than four or five in your entire movie.

For transitions, we leave most of them at the default cross-fade. We did, however, replace the transitions at some of our video's key scenes with transitions that had more flair. To replace a transition, drag the new one onto the existing transition between clips. It's that easy!

We then added nine text overlays, from opening title to closing credits. Put some thought into the first text clip, and choose the font, font color, and level of transparency. Then copy/paste it to preserve the formatting between your clips. Slide the credits into position and double-click each to automatically open the wizard so you can change the wording and animation.

STAGE 9: SAVE (RENDER) THE MOVIE

With the editing completed, the hard work is done. *Movie Maker 2's* wizard will guide you through the steps to save all the components of your video in a single file—this is called a render. Choose the best video quality your media and playback device can take advantage of. For maximum quality DVD video, we recommend you use the DV-AVI format. Your disc-burning app will be able to transcode the DV-AVI format to MPEG-2 for use on DVDs.

Saving or rendering the movie can take considerably longer than the actual duration of the video. At the highest quality settings, for instance, our 5 1/2 minute video took almost 40 minutes to render. The good news is that you can use your computer to do other things during the rendering process (just don't expect high frame rates in *Battlefield 2*—your CPU is working its butt off).

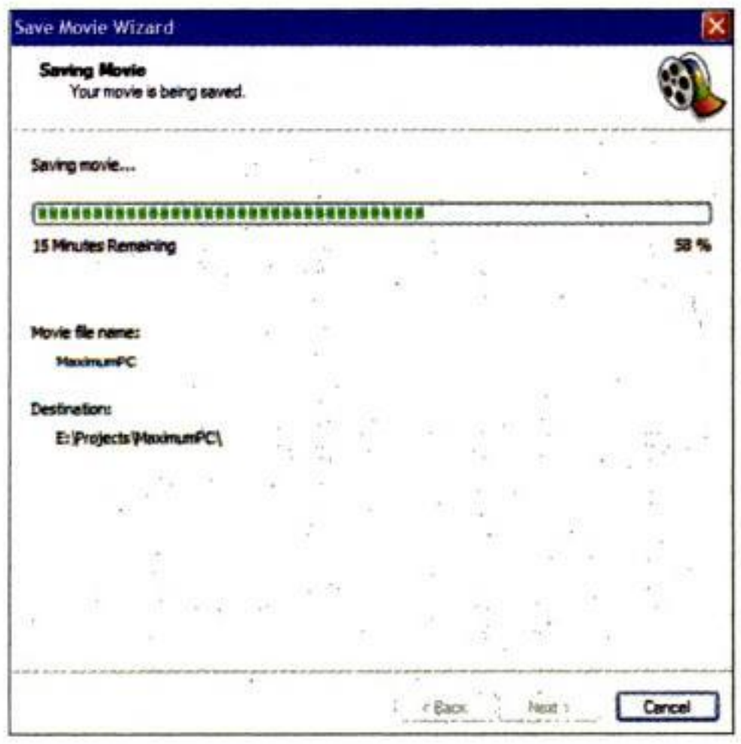
STAGE 10: ENJOY THE SHOW

OK, so we lied: Video editing isn't quite as simple as burning an audio CD. But we figured the ends—understanding the concepts of the timeline, synching, splitting, and rendering—would justify the means. It wasn't as bad as you thought it would be, was it?

From here, you can create a DVD with your disc mastering application (such as *Nero* or *Easy Media Creator*), burn it to CD or DVD as a data file, or use *Windows Media Encoder* to format it for a portable media player, PDA, or even a video-capable phone! MPC

Save Movie Wizard
Movie Setting
Select the setting you want to use to save your movie. The setting you select determines the quality and file size of your saved movie.
Best quality for playback on my computer (recommended)
Best fit to file size:
MB
Other settings:
Video for Pocket PC (218 kbps)
Show fewer choices...
Setting details
File type: Windows Media Video (WMV)
Bit rate: 1.0 Mbps
Display size: 640 x 480 pixels
Aspect ratio: 4:3
Frames per second: 30
Movie file size
Estimated space required:
42.97 MB
Estimated disk space available on drive E:
22.64 GB
< Back
Next >
Cancel

Even a modest application like *MM2* offers plenty of encoding options to help you tweak compression levels and optimize your video for different playback devices.



Rendering your movie is the final step, once that's done, you can enjoy the finished product, and view it on everything from DVD players to portable media players!

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Optical Disc **Tricks!**

Make a hybrid audio/data disc, tweak your DVD-Videos for higher compatibility, and create custom bootable CDs and DVDs

TIME 00:35 HOURS:MINUTES

Making an audio CD these days is as simple as drag-and-drop, and every disc-mastering program comes with software to walk you through the process of creating fancy-lad DVD menus for your video. But there's more to your optical drives than common tasks like these. You can, for instance, add data files to your audio CD (including cover art images or digitally compressed versions of the songs) without losing compatibility with CD players. You can also boost the set-top compatibility of your DVD-Video discs with a couple of simple tweaks. You can even create your own custom bootable discs with all the utilities you might need for a rescue job. Master optical-disc burning, and you'll be able to deliver miracles that leave recipients of your discs in awe!

BY LOGAN **DECKER**

Burn Music and Data on the Same Disc

1 Choose your format

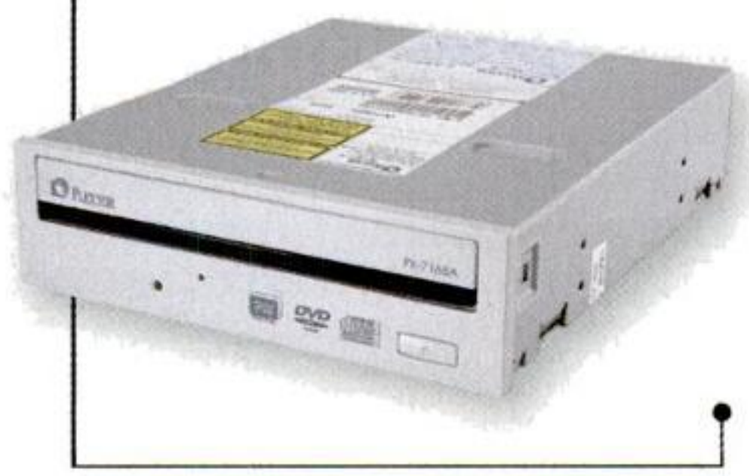
Your software might offer you several ways to combine audio and data on the same disc. The Mixed Mode and Pre-Gap methods, if they're available, should be avoided. These methods put the data track ahead of the audio track, and older CD players may attempt to "play" the data track. The result is a horrible screech—only slightly less unpleasant than a dentist's drill—that could damage your speakers. Instead, choose CD Plus or CD Extra, which are the same thing. CD Extra writes the audio tracks first, and then writes the data last in a single track. Because it closes the audio portion of the disc (called a session) before it starts a new session to write the data tracks, your CD player, which cannot see beyond the first session of a disc won't stumble into the data area.

Even if your disc-mastering software doesn't support CD-Extra by name, you should be able to approximate it using session-at-once (SAO) recording. Just start a multi-session disc, record the audio tracks in the first session, close it, then write the data in a second session, making sure to finalize the disc after that (you'll usually find that option on the last screen you see before you begin burning).

We used *Nero* to create our CD with audio and data files, but any application that supports either the CD Extra or session-at-once (SAO) recording format will work fine.

MATERIALS

- **CD AND/OR DVD BURNER**
- **OPTICAL DISC MEDIA**
- **WINDOWS XP PRO OR HOME**
- **WINDOWS XP SERVICE PACK 2**
- **ROXIO EASY MEDIA CREATOR**
  $100, www.roxio.com
  OR NERO ULTRA EDITION
  $80 downloadable, $100 boxed
  www.nero.com



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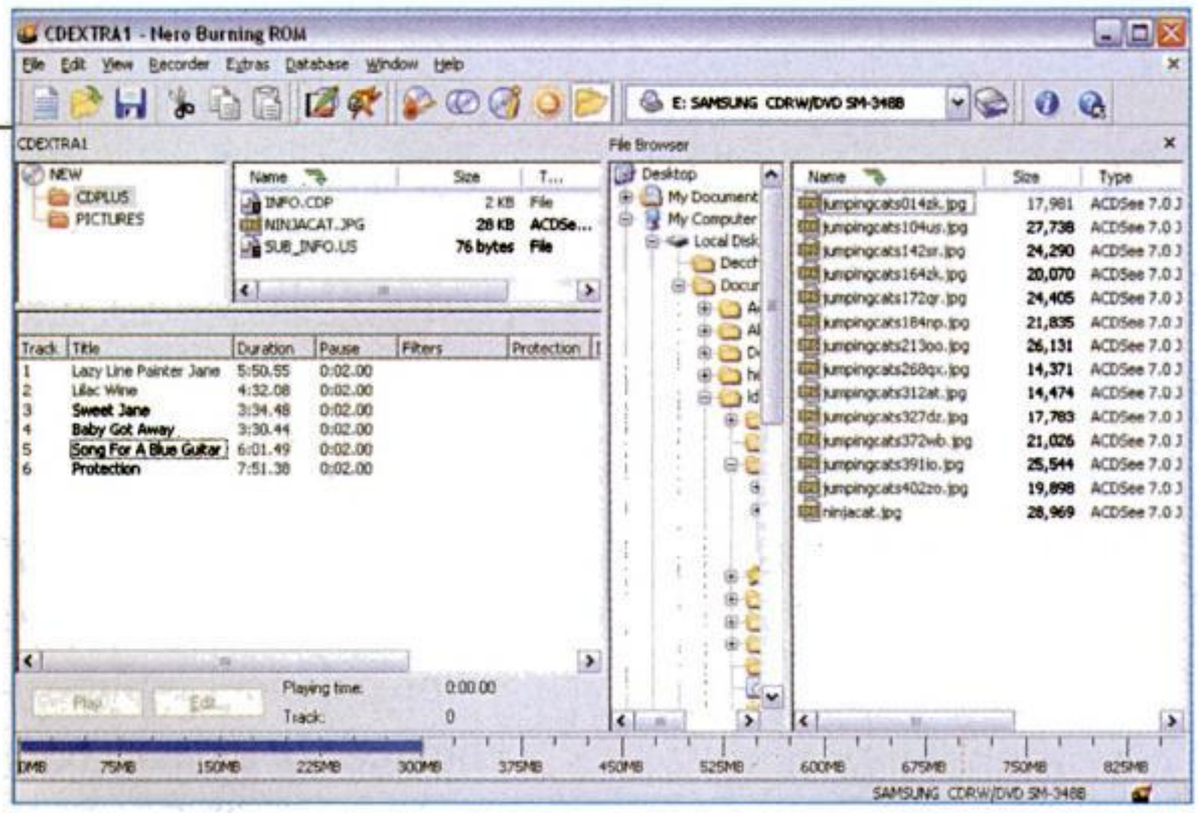
2 Load your disc

Once you select CD Extra as a destination format, your disc-mastering application will automatically create the folder structure required by the CD Extra spec. The CDPlus and Pictures folders are leftovers from a simpler time when visionaries imagined we'd be carrying around CD players with full-color screens. They're mostly useless, but you can use them, or not use them and create your own folders. No matter what you do, you'll be able to access these files through your PC.

Drag your audio files to the audio windowpane at the lower left. Data files can go into the folders already present (these folders can't be removed because they are part of the official CD Extra spec), or you can create your own folders.

Keep in mind that your audio files will be raw, uncompressed audio, so they'll take up a lot of space. Our six measly tracks take up 300MB of space!

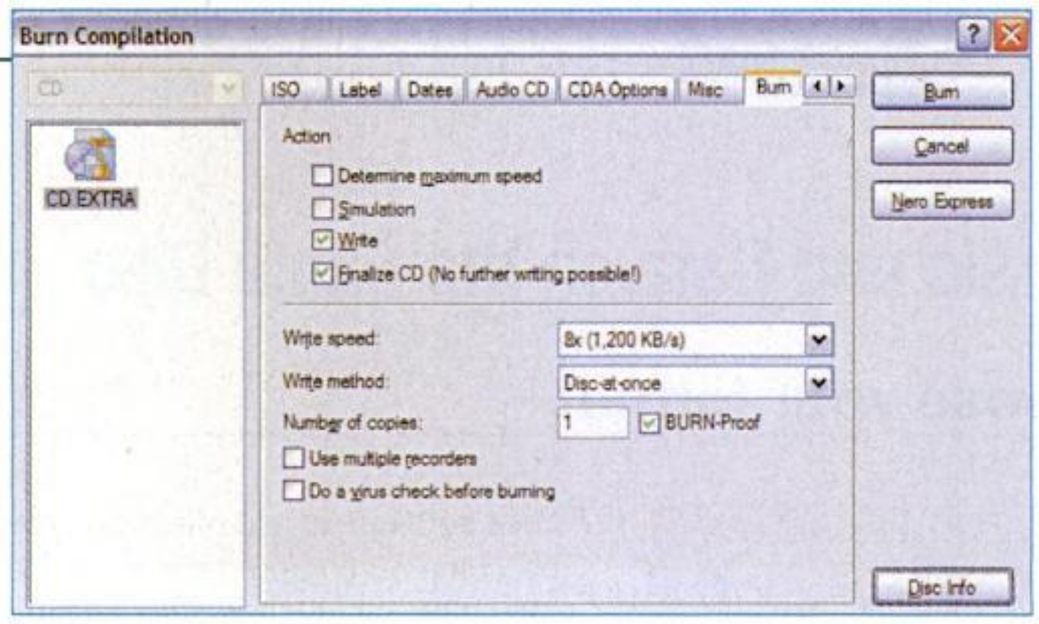

CDEXTRA1 - Nero Burning ROM
File Edit View Recorder Extras Database Window Help
E: SAMSUNG CDRW/DVD SM-348B
CDEXTRA1
File Browser
NEW
CDPLUS
PICTURES
Name Size T...
INFO.CDP 2 KB File
NINJACAT.JPG 28 KB ACDSe...
SUB_INFO.US 76 bytes File
Track Title Duration Pause Filters Protection
1 Lazy Line Painter Jane 5:50.55 0:02.00
2 Lilac Wine 4:32.08 0:02.00
3 Sweet Jane 3:34.48 0:02.00
4 Baby Got Away 3:30.44 0:02.00
5 Song For A Blue Guitar 6:01.49 0:02.00
6 Protection 7:51.38 0:02.00
Desktop
My Document
My Computer
Local Disk
Name Size Type
jumpingcats014zk.jpg 17,981 ACDSee 7.0 J
jumpingcats104us.jpg 27,738 ACDSee 7.0 J
jumpingcats142sr.jpg 24,290 ACDSee 7.0 J
jumpingcats164zk.jpg 20,070 ACDSee 7.0 J
jumpingcats172qr.jpg 24,405 ACDSee 7.0 J
jumpingcats184np.jpg 21,835 ACDSee 7.0 J
jumpingcats213oo.jpg 26,131 ACDSee 7.0 J
jumpingcats268qx.jpg 14,371 ACDSee 7.0 J
jumpingcats312at.jpg 14,474 ACDSee 7.0 J
jumpingcats327dz.jpg 17,783 ACDSee 7.0 J
jumpingcats372wb.jpg 21,026 ACDSee 7.0 J
jumpingcats391io.jpg 25,544 ACDSee 7.0 J
jumpingcats402zo.jpg 19,898 ACDSee 7.0 J
ninjacat.jpg 28,969 ACDSee 7.0 J
Play
Edit
Playing time: 0:00.00
Track: 0
0MB 75MB 150MB 225MB 300MB 375MB 450MB 525MB 600MB 675MB 750MB 825MB
SAMSUNG CDRW/DVD SM-348B

***Nero* makes creating audio and data compilations a snap. Remember that you've still got complete control over pauses between audio tracks, and you can still apply filters and effects (like volume normalization) to any or all of them.**

3 Burn the compilation

Before you initiate the burn process, consider who's going to use the disc, and on what kind of equipment. If you're giving it to a friend for listening in the car, or if you'll be playing the disc on an old boom box before looking at the saved pictures on your PC, we recommend cranking down the burn speed as low as you can tolerate; no more than 16x in this instance, and 8x is preferred. Compatibility problems with older players can generally be solved by burning your discs at a slower speed.

Click the matchstick icon to begin burning, or go to the Recorder menu and click Burn Compilation.



The older the player your disc might end up in, the lower you should set the burn speed. And don't forget to check the "Finalize CD" box!

minihow2

MAKE A SET-TOP COMPATIBLE DVD

Recordable DVD tweaking tips for persnickety living room players

With no less than five different recordable DVD formats squatting on the shelves and no indication about their compatibility with set-top DVD players, despair is a natural human response. Well chin up, folks, because we've got a few tips on increasing the odds that the DVD-Video you burn will be enjoyed—or at least endured—by even your grandmother with her old hand-crank DVD player.

1: Choose a format. In our tests, DVD-R has the highest compatibility with set-top players, but DVD+R follows very closely behind (and among newer PC and set-top players, the difference is negligible). Trailing far behind are the rewriteable formats (though we've found DVD-RW to have a slight edge).

2: Once you've selected a format, there's a simple, intuitive way to nudge compatibility upwards—throttle down your burning speed. It's a drag, but it works by darkening the burn marks on the surface of the disc, increasing their reflectivity so older players can accurately read the data stream.

3: A little-known tweak involves changing the disc's so-called "book type" (a reference to the different types of books published by standards committees that describes the physical construction of discs). Also referred to as "bitsetting," this technique is particularly effective with many older set-top players. In order to take advantage of bitsetting, you'll need a drive and software that both support the feature (current versions of both *Nero* and *Easy Media Creator* do), and DVD+R or DVD+RW media (DVD-R/W formats don't permit bitsetting). What bitsetting does is force the disc to announce itself to your set-top player as a DVD-ROM, which prevents some players from rejecting a disc that introduces an unfamiliar disc type. If this is a must-have for you, search for "bitsetting" at www.cdfreaks.com, where you'll find reports from forum regulars on which drives support this fancy sleight of hand.

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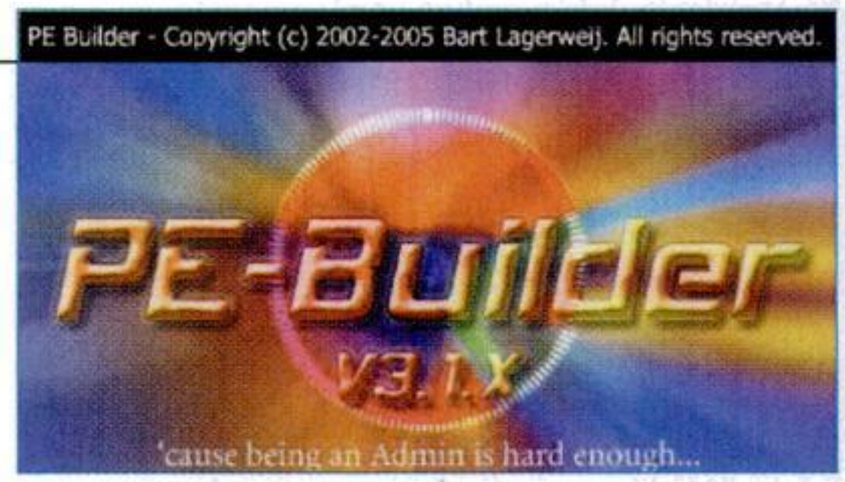
Make a Bootable CD-ROM

1 Prep work

If Windows doesn't feel like starting up and your files are being held hostage, booting into a DOS environment with a floppy disk or floppy emulation won't do you much good because you can't access NTFS partitions. This floppy-less method gives you access to all your files (provided the problem isn't with your drive; if it is, you have our sympathies).

Fortunately, most of the hard work's been done for you by Bart Lagerweij, whose Preinstalled Environment (called BartPE for short) has got everything you need to create a bootable CD complete with network support and even a pleasant graphical interface. Even more charming is that he's giving away the fruits of his labor for free. Yes, that's "free" as in "beer." So let's go shopping.

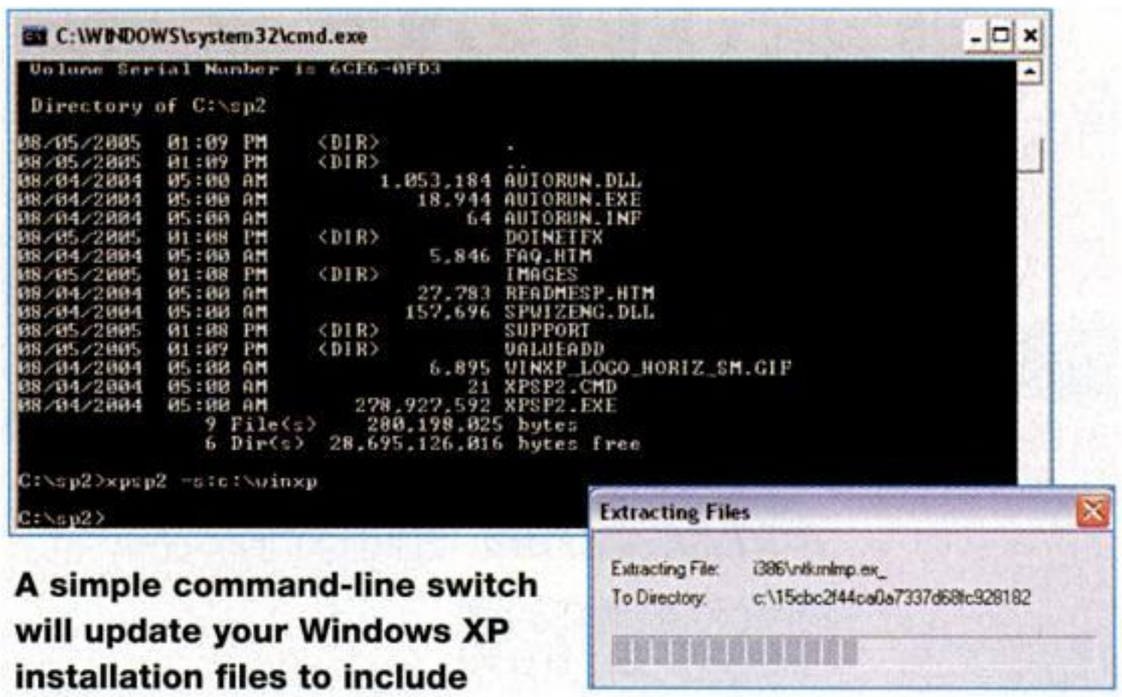
Go to **www.nu2.nu/pebuilder** and download *PE Builder* (now at version 3.1.3). Note: You will also need your original Windows XP installation disc (Home or Professional) as well as Service Pack 2. You can download Service Pack 2 at **www.microsoft.com/windowsxp/sp2/default.mspx**.



The emblem of Bart Lagerweij's Preinstalled Environment bootable CD grindhouse. If you're serious about making sophisticated bootable discs, you'll be spending a lot of time with *PE Builder*.

2 Rip your OS discs to the hard drive

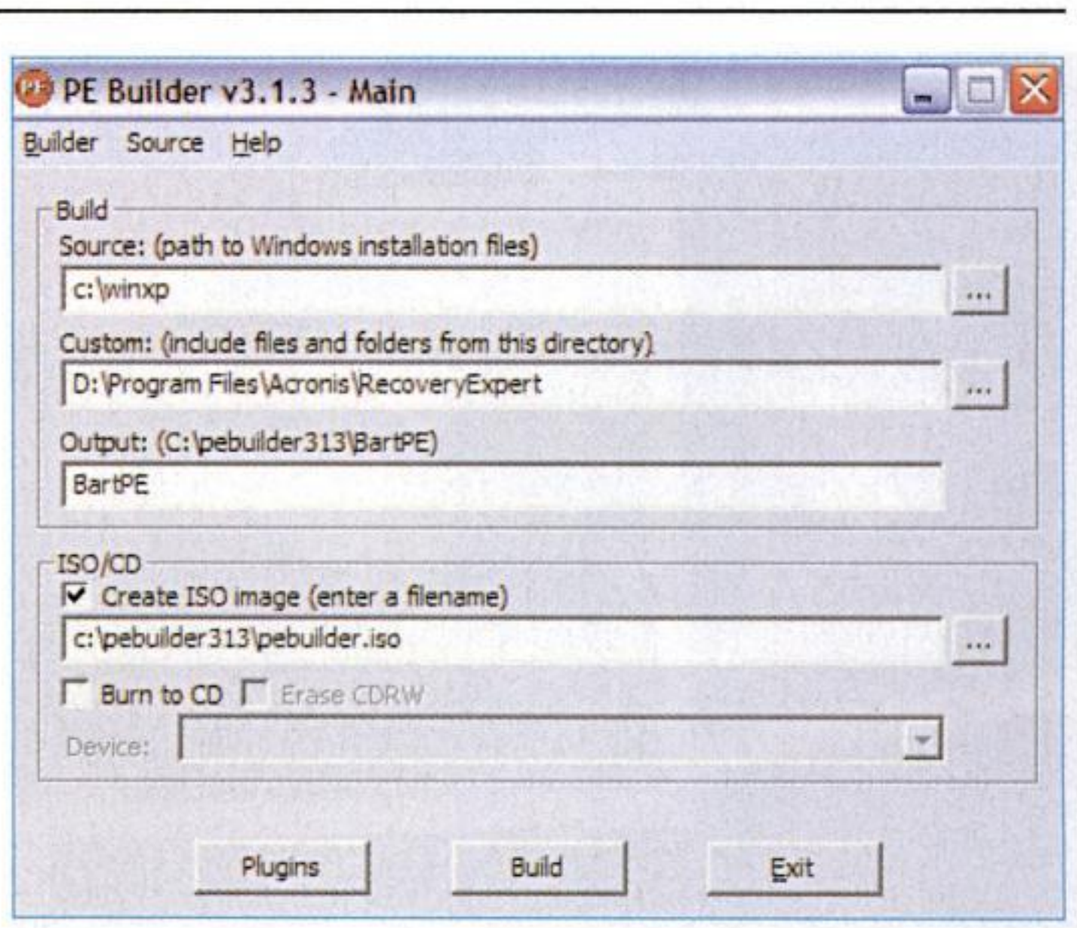
Put your Windows XP disc in the drive and copy the contents to a folder on your PC, preferably close to the root directory of your C: drive (you'll understand why in a second). Next, create another folder for SP2 and move the contents of the disc into that folder. Now click Start > Run and type `cmd` to open a DOS box. Navigate to the folder where you saved the SP2 installer—if you place this file near the root directory it will be much easier to access; you can delete it later. Type the name of the SP2 installer followed by the `–s:` command-line switch, and then add the path to the Windows XP disc files you copied earlier. Do not put a space after the "`s:`" For example, if your WinXP files are located at c:\winxp, then type `xpsp2.exe -s:c:\winxp`. SP2 will integrate itself into the Windows XP installer.



A simple command-line switch will update your Windows XP installation files to include Service Pack 2.

3 Configure PE builder

Launch *PE Builder*. Under Source, enter the path to your Windows XP installation files. Under Output, select a destination directory for your finished disc image. Under ISO/CD, you have the option of saving the image as an ISO disc image, burning the results directly to CD, or both. You may also add any folders and files (such as utilities or data-recovery apps) by placing them all into one directory and entering the directory path under Custom.



From *PE Builder's* humble command center, we're opting to create an "image" of our bootable disc in the ISO format rather than burn directly to disc, so we can alter the contents later if necessary.

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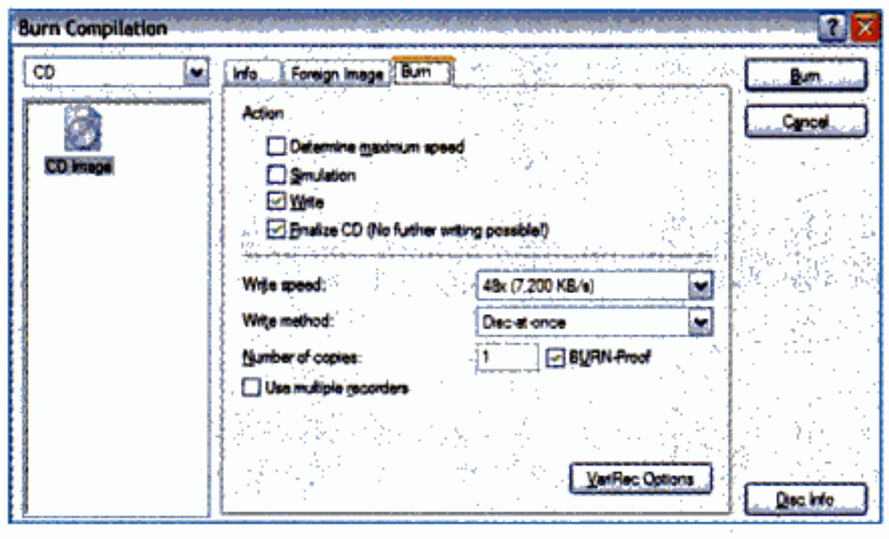
4 Bake your boot disc

PE Builder also gives you the option of adding plugins developed by Bart himself or clever third parties. These run the gauntlet from ASPI layers to disk utilities, *Ad-Aware* to mouse drivers, and they'll all be automatically added to your compilation (you can find scads of them at **www.nu2.nu/pebuilder/#plugins**). Now click Build and kick back. When *PE Builder* is done, you'll have a fresh, bootable CD-ROM (unless you chose to make a disc image instead—all you have to do is burn this image to a disc with any disc-mastering program).



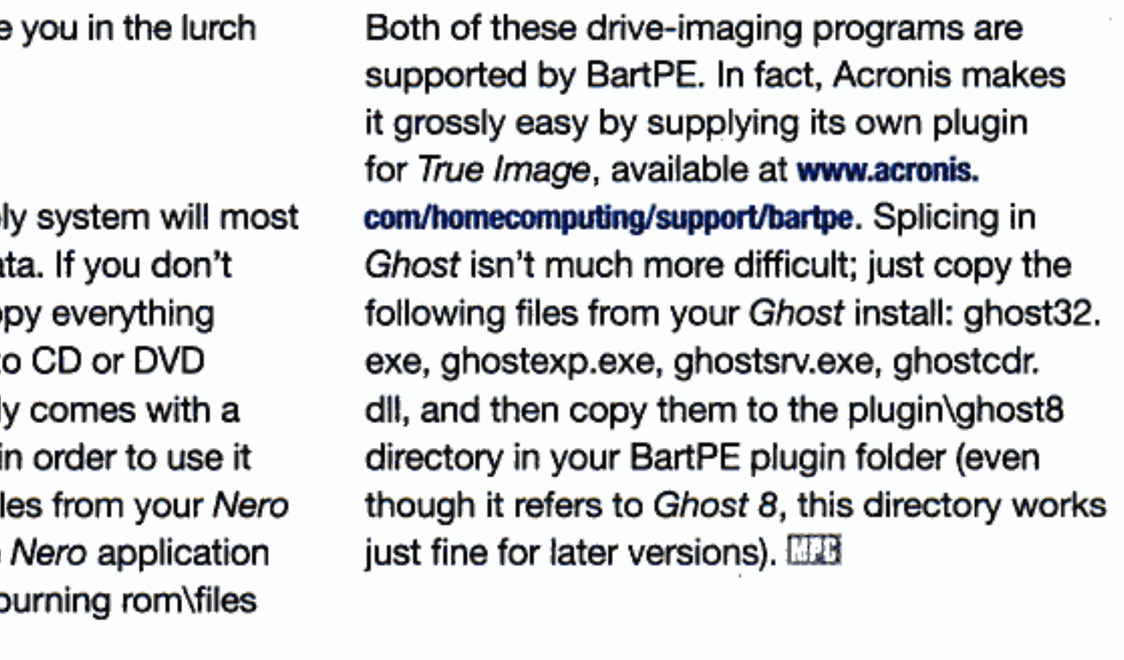
The final step is to burn your disc image to a CD. Select Disc-at-once recording, and if you're worried about compatibility with other PCs, notch down the burn speed to 8x or 16x.

5 Fun with BartPE

For the real go-getters out there, creating a BartPE ISO image is only the beginning. You can find a list of the plugins included in the BartPE download at the BartPE site, as well as links to other plugins available from third parties (including commercial software developers). Here are two must-haves for a bootable "rescue" CD that won't leave you in the lurch after a disaster.

NERO

Your first priority on a wobbly system will most likely be evacuating your data. If you don't have an external drive to copy everything onto, you'll need to burn it to CD or DVD instead. BartPE conveniently comes with a plugin for *Nero* built in, but in order to use it you'll need to copy all the files from your *Nero* install (everything within the *Nero* application folder) into the plugin\nero burning rom\files directory of your BartPE plugin folder. Then open the penero.inf file in the Nero plugin folder using *Notepad*. Look for the line that says [Software.AddReg] underneath your version of *Nero* (5.x or 6.x). Note that this line and the three beneath it are preceded by a semicolon and some spaces; remove the semicolon and the spaces before all four lines, and edit the last three lines to reflect the user name, company, and serial number from your *Nero* installation. Save the penero.inf file, and *Nero* will be available from the BartPE CD you created.


penero.inf - Notepad
File Edit Format View Help
; nero.inf
; PE Builder v3 plug-in INF file for Nero Burning Rom 5.5.x and 6.x
; Created by Bart Lagerweij
[version]
Signature= "$Windows NT$"
[PEBuilder]
Name="Nero Burning Rom"
Enable=0
Help="penero.htm"
; Nero v5.x
; Uncomment the 4 lines below to include registration
; Make sure you also uncomment the "[Software.AddReg]" line!!!
;
; [Software.AddReg]
; 0x1, "ahead\Nero - Burning Rom\Info", "User", "Your name"
; 0x1, "ahead\Nero - Burning Rom\Info", "Company", "Your company name"
; 0x1, "ahead\Nero - Burning Rom\Info", "Serial5", "nnnn-nnnn-nnnn-nnnn-nnnn-nnnn"
; Nero v6.x
; Uncomment the 4 lines below to include registration
; Make sure you also uncomment the "[Software.AddReg]" line!!!
;

All you have to do to enable support for *Nero* within BartPE is copy the application files and edit the penero.inf file in the *Nero* section of the BartPE plugin directory.

NORTON GHOST/ACRONIS TRUE IMAGE

Both of these drive-imaging programs are supported by BartPE. In fact, Acronis makes it grossly easy by supplying its own plugin for *True Image*, available at **www.acronis.com/homecomputing/support/bartpe**. Splicing in *Ghost* isn't much more difficult; just copy the following files from your *Ghost* install: ghost32.exe, ghostexp.exe, ghostsrv.exe, ghostcdr.dll, and then copy them to the plugin\ghost8 directory in your BartPE plugin folder (even though it refers to *Ghost 8*, this directory works just fine for later versions). MPC

Ask the Doctor

Diagnosing and curing your PC problems

PASSWORDS: A BLESSING OR A CURSE?

I work in a computer store selling laptops. A disgruntled customer set a hard drive password on one of our laptops, so I can't access its contents. Is there an easy way to fix this? Can this feature be disabled to prevent future occurrences, yet still allow other customers to examine our laptops?

—Bob Parlinari

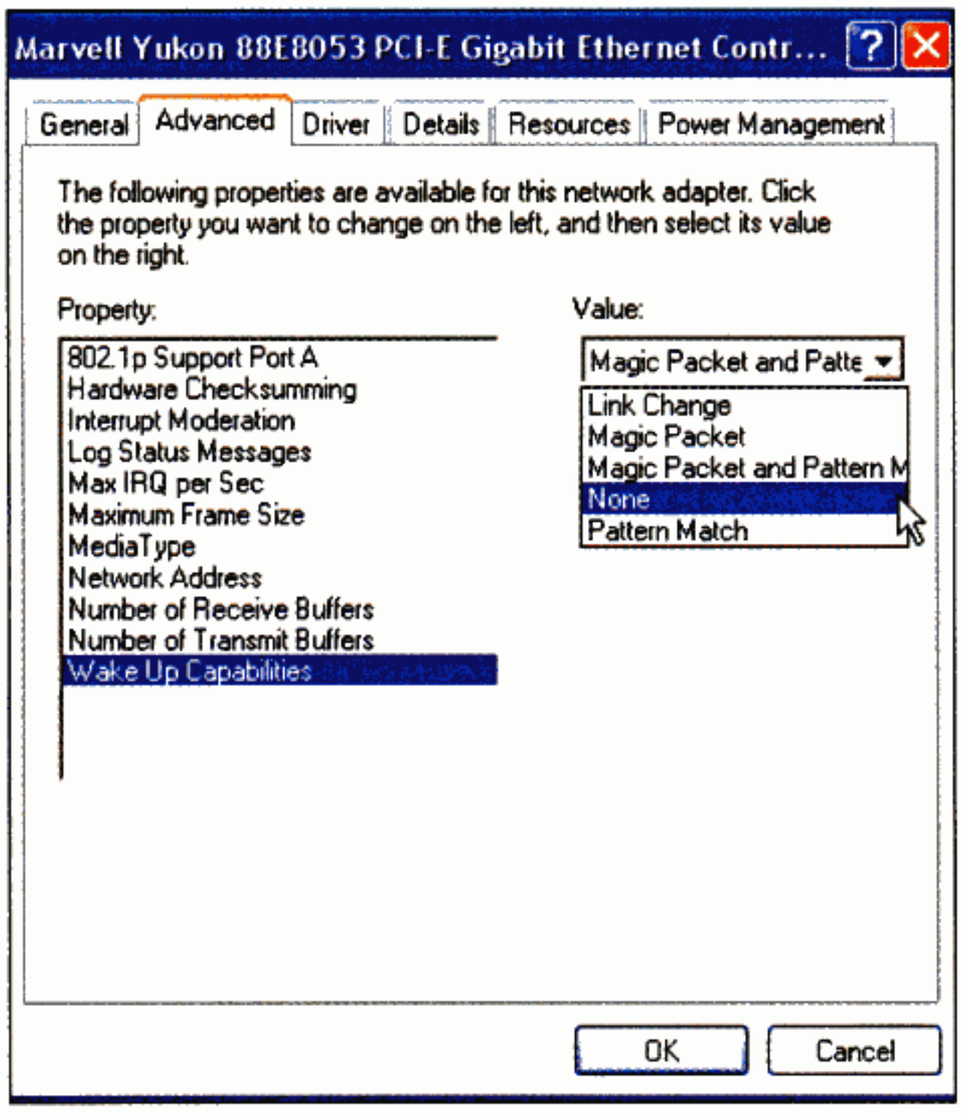
The hard drive lock is there for a reason, and it appears to be doing its job, as it's not allowing you to access the drive's contents. If the Doctor told you how to bypass it, he'd be aiding and abetting laptop thieves nationwide. There's also the small matter of how the Doc doesn't think it's *possible* to sidestep a hard drive password.

The password is stored in the drive's firmware, so reformatting the drive won't erase it; plugging the drive into another machine won't work, either. If you can't guess what the secret word is, your only real solution is to obtain the password from the customer, boot the machine, and then reset it. The only surefire way to prevent this from happening to other machines in your inventory is to remove their batteries and secure their power supplies behind the counter, so the machines can't be powered up without your permission. Once you explain to your customers the reason for your caution, they'll likely appreciate the tight security this feature provides.

Continued on next page→

Ask the Doctor

Continued from page 55



Your PC's not possessed. If it's randomly powering itself on, despite your disabling all its "wake on" features in the BIOS, check its Ethernet card's properties within Windows' Device Manager.

GHOST IN THE MACHINE

My computer turns on by itself. I've already shut off all the relevant BIOS options: boot on keyboard, mouse, network, and so on. The problem persists even though I've completely reformatted my system. What's causing this?

—Daphne Ketchum

If you're absolutely sure you have turned off all the BIOS "wake on" modes, the most likely culprit is the setting that dictates what the machine does after a power loss. In the event of a blackout, or even if you accidentally turn off the power strip, the BIOS on most motherboards defaults to restoring the PC to its latest state—off—when the power comes back. Yours, however, might be set to turn on.

Another possibility is that your network adapter has a "wake on" setting. Open the Windows Device Manager, expand the Network Adapter heading, and right-click your Ethernet controller. Click the Advanced tab and look for "wake up capabilities," or something similar. If that's not the problem, it's possible a bad power supply or some other piece of faulty hardware is shorting out and restarting the board. Make sure all your add-in cards and power connectors are firmly plugged in, too.

MY NARCOLEPTIC PC

When I boot my PC after it's been shut down for a while, everything is fine for about 20 minutes, and then it shuts down on its own. The only way to get it to turn back on is to pull the power cord, wait for the light on the power supply to go out, and then plug it back in. I've thoroughly checked the machine for viruses, and I've even replaced the battery on the mobo.

— J.T. Allen

Not knowing all your hardware specs makes it tough for the Doctor to diagnose your problem, but his first guess is that your PC's power supply is the cause. If you can borrow a friend's PSU, swap it out and see if the problem goes away.

It's also possible that the machine is overheating, but that's a long shot, because the machine would crash repeatedly.

PREMATURE BOOT-ULATION

I just built my first computer, using an Asus A8N SLI Deluxe mobo, but I can't get into its BIOS. The computer seems to be working fine, but I want to disable its onboard sound. An onscreen message tells me to hit the Delete key to enter setup, which I've done repeatedly, but the machine just continues booting until Windows starts up.

—Stephen Konkol

You're probably just encountering a timing problem. If your monitor takes a few seconds to respond to an incoming video signal, and you're waiting for that "press Delete to enter setup" message to appear, it might already be too late. Power off your PC, restart it, and begin mashing the Delete key about once every second until you get into the BIOS. Once you're in, disable the "quick boot" feature, so you'll have more time to do this in the future.

If that doesn't work and you're using a USB keyboard, try plugging in a PS/2 keyboard, instead. Most new mobos work fine with the majority of USB keyboards, but we've encountered a few that prevented us from accessing the BIOS.

MORSE CODE?

I recently installed an 80GB Hitachi Deskstar drive in my daughter's PC. Now when the machine boots, it produces a series of beeps. I found a listing of generic beep codes on the Internet, which tells me that the beeps indicate a problem stemming from either the power supply or the motherboard. Is there any way to test the power supply before I drop more money on a new motherboard?

—Sean Butler

That series of beeps is a POST (power-on self test) code, which is designed to alert you to a problem that's preventing your PC from booting. Unfortunately, the beep codes aren't as universal as Morse code. To learn the specific meaning of yours, find out what type of BIOS is installed and then check your motherboard manual (which should be available on the manufacturer's website, if you don't have a copy). Before you spend more money on hardware, make sure your RAM isn't the problem. Move the PC's memory sticks into different DIMM slots and reboot. If that doesn't work, remove all the modules except one, and swap them out until the PC boots normally. The next step would be to replace the power supply, but if that doesn't work, the only solution might be to replace the motherboard.

THE URGE TO MERGE

I'd like to consolidate my storage needs into a single hard drive of either 200- or 300GB. My motherboard has Serial ATA ports, but I've never used them. Is it worthwhile to purchase a Serial ATA hard drive over a standard IDE hard drive? If it is, can I transfer everything from my existing hard drives to the new hard drive?

—Steven Facker

First things first, Steve: There is no performance difference between SATA hard drives and parallel ATA hard drives of the same make and model. The SATA interface offers more bandwidth than PATA, but it's a moot point because not even

Are the four horsemen of the apocalypse running roughshod over your PC? Tell War, Pestilence, Death, and Famine to take a hike, because the Doctor is here. And because redemption is priceless, the Doctor's services are free. Just send an email describing your problem to **doctor@maximumpc.com**.

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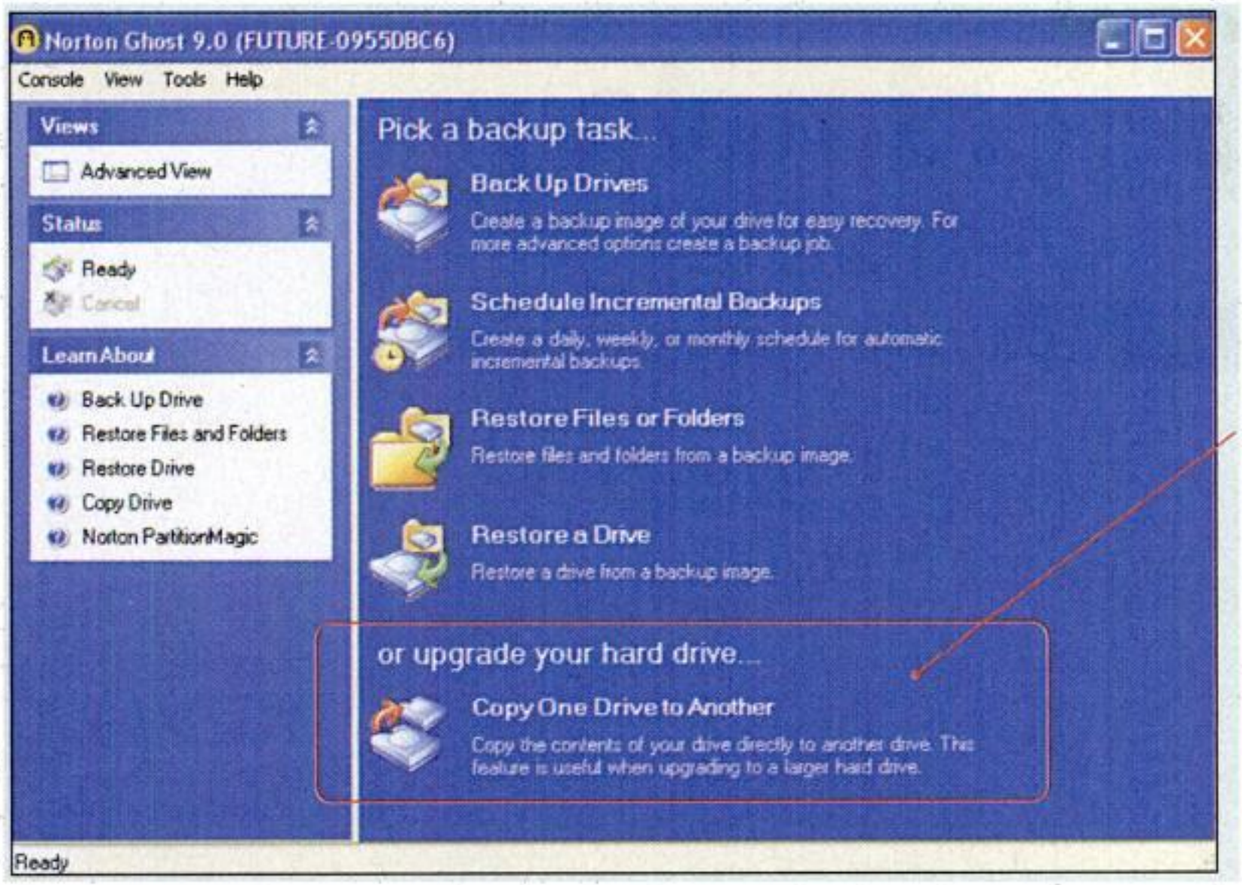
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Restore Files and Folders
Restore Drive
Copy Drive
Norton PartitionMagic
Pick a backup task...
Back Up Drives
Create a backup image of your drive for easy recovery. For more advanced options create a backup job.
Schedule Incremental Backups
Create a daily, weekly, or monthly schedule for automatic incremental backups.
Restore Files or Folders
Restore files and folders from a backup image.
Restore a Drive
Restore a drive from a backup image.
or upgrade your hard drive...
Copy One Drive to Another
Copy the contents of your drive directly to another drive. This feature is useful when upgrading to a larger hard drive.
Ready

A drive-imaging program, such as *Ghost* provides an easy method of transferring your data from one hard drive to another.

today's fastest drives are capable of saturating the ATA/100 bus. Having said that, SATA drives are easier to configure, because they have no jumpers and their cables are much smaller and easier to deal with.

As for transferring your data, you have two choices: You can install the new drive and then reinstall Windows and all your apps, games, and so forth. Then connect the old drive and copy over all the data files you need. The easier solution is to purchase a drive-imaging program, such as *Ghost*, and clone the drive. The utility will ask you which drive is the master and which is the target, reboot the system, and then perform a bit-by-bit transfer to the new drive.

BURIED TREASURE

*I have a Dell 670 workstation with dual 3.2GHz Xeons and dual 350GB hard drives in RAID 1. My OS is messed up—it gets to the Windows XP screen with the blue scroll bar, but then just sits there and scrolls. I need the pictures, **Excel**, and **Word** files on those hard drives, but the PC won't boot in Safe Mode or in any other configuration. Am I stuck paying big bucks for professional data recovery, or can I set those drives up as slaves on a different system so I can grab the files off them?*

—Donald Tucker

There's no reason to pay for expensive data recovery unless your hard drives crash. A dead Windows install is usually pretty easy to recover. You have two options: A utility disc, such as *BartPE* (www.nu2.nu/pebuilder/) will let you access a NTFS hard drive via a bootable CD-ROM; alternatively, you can reinstall Windows to a different folder on your C: drive (c:\winxp\, for example, instead of the default c:\windows\).

Reinstalling Windows in another directory is not a long-term solution, but it should let you access the drives long enough to back up your precious data. But because you have a Dell, it likely came with a restore-image CD instead of an actual Windows-install CD. If you use the restore-image CD to reinstall Windows, it will overwrite everything on the drive. And that brings us back to the *BartPE* option: If you have another computer on which you can build the *BartPE* disc, that's a vastly superior option. *BartPE* will bypass the copy of Windows that's installed on your computer and let you transfer your files to an external hard drive, USB key, network share, or even a DVD. MPC

SECOND OPINION

In your September issue, Robert Burnham talked about the death rattle on his Sony DRU-710A DVD writer. I have the same drive and experienced the same problem while using *Nero*. I was about to toss the drive in the trash when I had a revelation: The problem wasn't the drive, it was Windows! When I examined the IDE channel properties using Windows' Device Manager, I discovered that the device transfer mode had somehow been changed from DMA to PIO Only. Once I changed this setting back to DMA 66, the rattle disappeared and the drive resumed reading all types of optical media.

—Pastor Dave Ambroso

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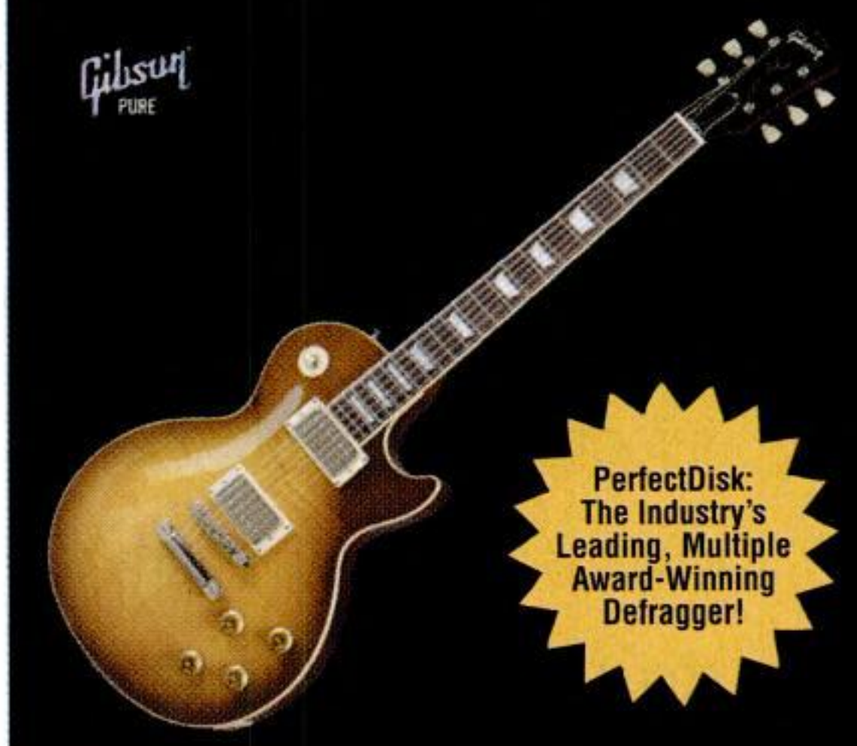

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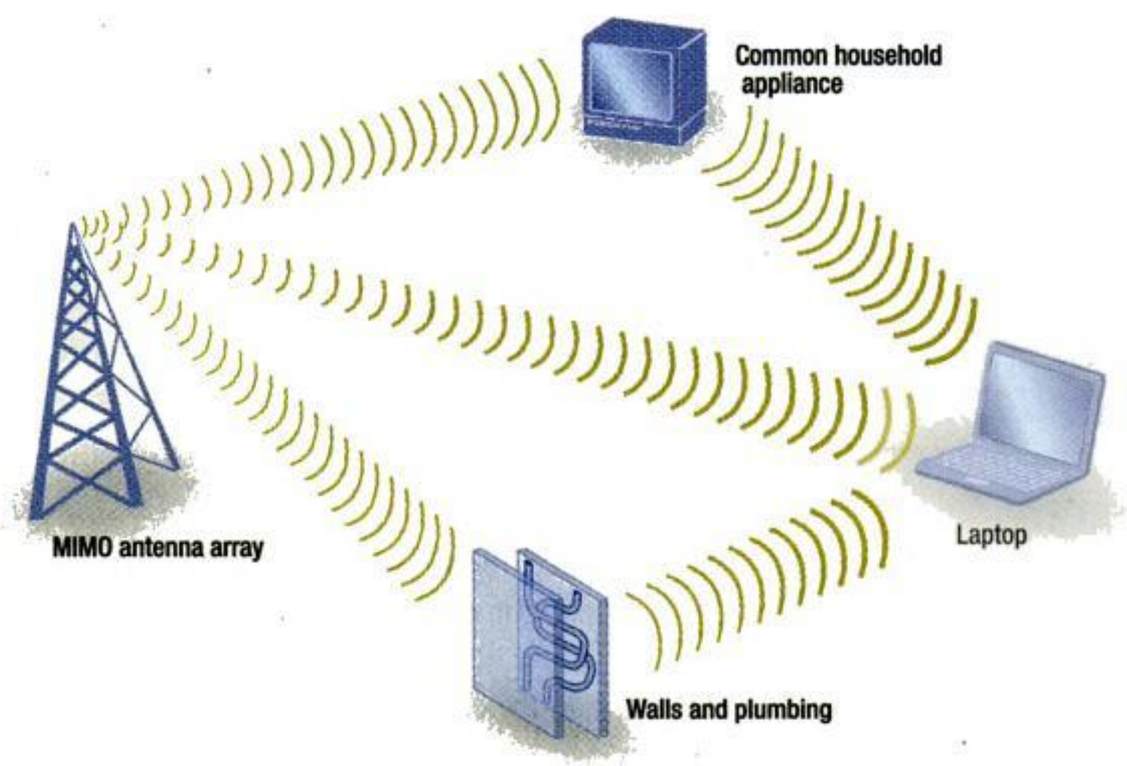
White Paper: MIMO Technology

Marconi's idea of sending information from point A to point B without wires changed the world, but multipath signal propagation is radio's Achilles' heel. MIMO promises to transform this weakness into a Wi-Fi benefit

BY BILL **O'BRIEN**

HOW IT WORKS **MIMO: a new approach to Wi-Fi**



►Walls and other physical objects between the transmitting and receiving antennas scatter the data signals, so they arrive at different times. A MIMO router assembles these scattered signals into one.

Antennas, whether transmitting or receiving, are transducers. On the sending side, they convert alternating current (AC) signals into a radio frequency (RF). On the receiving end, they convert that RF signal back into AC. Between those two points, however, every wall, building, cloud, and signpost in the world is waiting to deflect, reflect, or block that signal. Technically, this reflection is called "multipath signal propagation."

The original antenna designs were meant to span vast open spaces, not concrete jungles. The ghosting you see on your television is the result of reflected signals bouncing off objects and arriving at the receiving antenna at different times. (Don't snicker if you have cable. As time goes by and your cable line degrades, resistance will build up in the wire and you'll see ghosting, too.) Just try to get radio reception inside a modern building or even while driving under a bridge. When you realize that broadcast sources are unable to penetrate much of the physical world even with tens of thousands of watts of power at their disposal, it's easy to understand why the Wi-Fi setup in your home or office, working off only a few thousandths of a watt, can't seem to make it through those two plasterboard walls and down the stairs reliably.

This is where MIMO (multiple input, multiple output) steps up and says, "I can do that." It's a revolutionary application of antenna technology that, backed by firmware in Wi-Fi equipment, has been optimized to turn the weakness of multipath signals into a huge bandwidth advantage.

The three antennas on this Linksys router reveal its MIMO genes.

DEFINING MIMO

There are pages upon pages of finely tuned calculations—enough to glaze the eyes of even the most stalwart geek—describing the propagation characteristics of the average antenna under a variety of configurations and conditions. Add in the possibilities of multiple antennas, as we do with MIMO schemes, and it's doubtful you'd be able to budge the world of associated math even with a very long lever and an extremely firm place to stand. While making the definition of MIMO hyper accurate, these equations are best avoided.

Simply put, MIMO uses an array of antennas (more than one, thus the "multiple" on both sides of its acronym) when sending and receiving. At first you might think this is just another iteration of the "smart antenna" that's been around for decades. Those devices fall into two general categories: SIMO (single input, multiple output) and MISO (multiple input, single output). Basically, SIMO and MISO systems rely on a predicted level of interference, for which their antennas are then tuned. These optimizations compensate for much of the noise (reflections, etc.) that arises between send and receive points. The more antennas used on either side of the system, the better the results.

The theory behind SIMO and MISO technology is an attempt to mitigate the problems caused by multipath signal propagation. MIMO, on the other hand, although foundationally based on its predecessors, goes one giant step further: MIMO technology attempts to *exploit* those propagation effects to provide increased bandwidth and signal reliability.

SIFTING THROUGH THE STATIC

Here's how it works: The outgoing data stream is broken down into multiple streams

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and is then transmitted in parallel through several transmitting antennas. The receiver is also equipped with an array of antennas and acquires these multiple streams as superimposed "images," not independent signals. Keep in mind, however, that signal scattering (caused by environmental obstacles) could leave each signal with a slightly different profile: One stream might lack definition at a certain point in the transmission (which would normally be perceived as a drop-out that could disrupt or negate the validity of the data stream), while another might be very well defined at that same point (but lacking somewhere else).

That's when the signal processing firmware comes into play on the receiving side. It identifies the various substreams, compares the scattering effects, and creates a single valid signal from them. Finesse at this point is, of course, crucial. In validating the multiple streams, the strongest signal is first extracted from the group. Theoretically, that should be the most reliable one, but it's also the source of the most noise on top of the remaining signals. Once that's out of the way, the process continues through the rest of the streams, repeating down to the weakest signal. (Remember, it's not all magic. These signals can be differentiated from each other thanks to the differences created by multipath propagation.)

In theory, much of which has been proven in practice, the more multipath propagation effects that occur, the more accurate the final signal will be, because more points of comparison can be made between the multiple streams. In other words, the more a signal is scattered, the more likely it is that multipath effects will cause different differences in that signal, which, when compared with each other, will result in one cohesive signal when processed.

MIMO IN THE REAL WORLD

As you might suspect, one result of MIMO technology is more reliable transmissions, but that is only one result. The other is increased range. In case you're forming the question "Huh?" on your lips after reading that, consider what's happening. Multipath signal propagation normally leads to truncated distances: The scattering effect causes the signal to fade into oblivion. MIMO won't have unlimited range, but because the technology uses interference to regenerate the signal, the point where you lose signal moves further from the transmitter. A degraded signal is problematic for a typical antenna and receiver, but a signal needs to be nearly nonexistent for MIMO to stop working.

You've probably already identified the "weak" point in MIMO technology: signal processing. Not only is the original transmission divided at the starting point, it must also

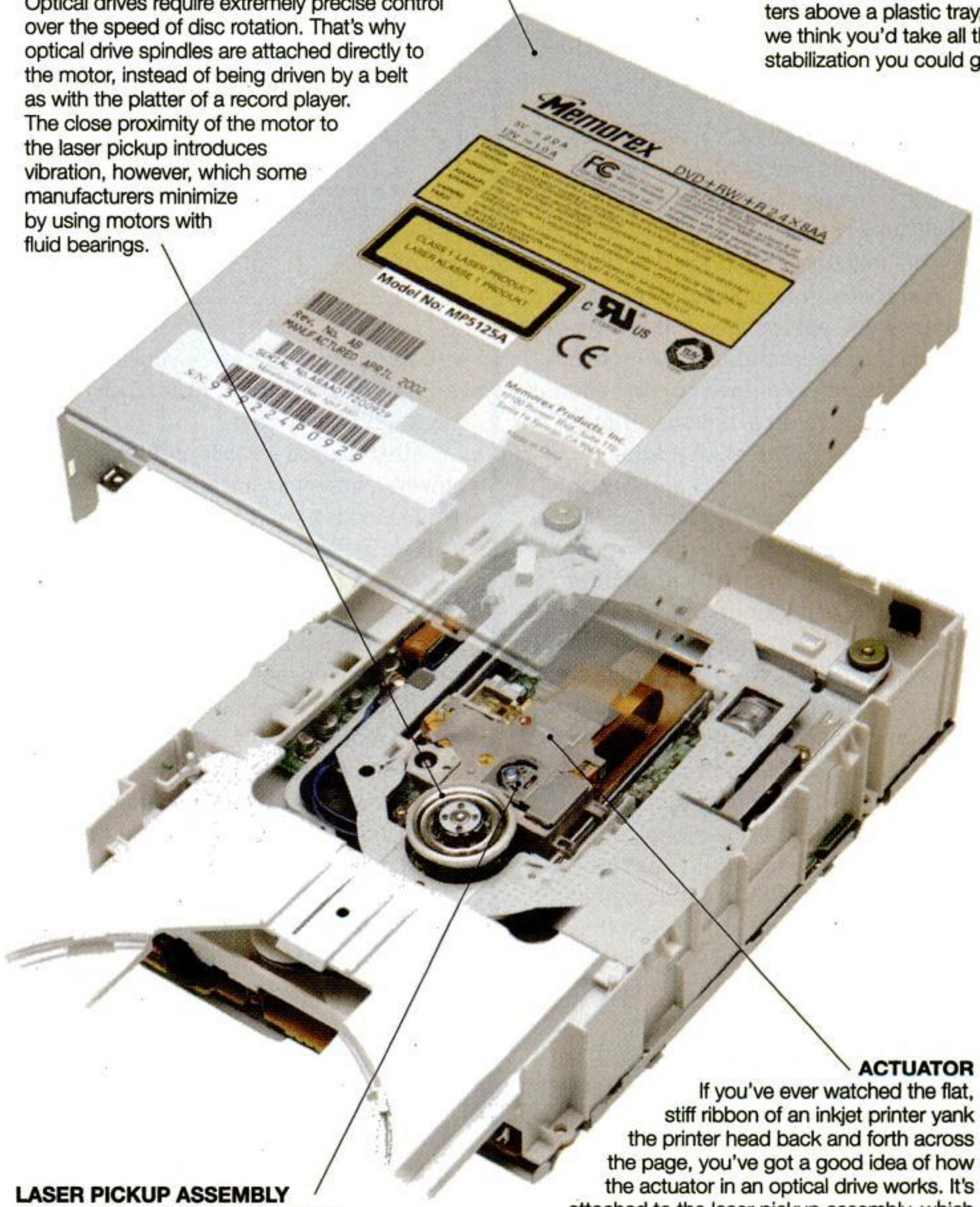
Anatomy of an Optical Drive

From CD-ROMs to double-layer DVD burners, optical drives pack some wicked technology in those ugly little metal enclosures. And let's face it: Everybody loves lasers!

CHASSIS
The sticker on the chassis contains the usual technical yadda yadda, but take a moment before you install the drive to jot down the drive's model and serial numbers and file them somewhere accessible. That way you won't have to pry open your case if you need to contact technical support later.

CLAMP
The clamp rests on the unprinted inner hub of optical media for additional stabilization. Big whoop, right? Well, if you were a polycarbonate disc spinning at 10,000rpm millimeters above a plastic tray, we think you'd take all the stabilization you could get!

SPINDLE
Optical drives require extremely precise control over the speed of disc rotation. That's why optical drive spindles are attached directly to the motor, instead of being driven by a belt as with the platter of a record player. The close proximity of the motor to the laser pickup introduces vibration, however, which some manufacturers minimize by using motors with fluid bearings.



ACTUATOR
If you've ever watched the flat, stiff ribbon of an inkjet printer yank the printer head back and forth across the page, you've got a good idea of how the actuator in an optical drive works. It's attached to the laser pickup assembly, which is in turn mounted to lubricated rails that run parallel to the sides of the drive. The actuator moves the pickup assembly quickly back and forth beneath the spinning disc, reading the data before it's reconstituted into Word documents, video clips, or pictures of humiliated cats wearing fake antlers on Christmas Eve.

LASER PICKUP ASSEMBLY
The pickup assembly is a little throne where the laser squats beneath a system of lenses, shining a laser on the underside of optical discs to read the "pits" and "lands" stamped on the disc. These pits and lands are the physical manifestation of the digital ones and zeroes that make up your data. Some players and burners use two separate lasers for CD and DVD work, while others use a single laser that is capable of modulating its wavelength between both formats.

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be separated, compared, and recombined at the terminus. That process takes time. While MIMO has provisions for any number of antennas on either side of the transmission, the more signals that are sent, the more signals that must be processed (on both sides), and that means longer processing time.

To be fair, we're taking about intervals shorter than the blink of an eye. However, we're also dealing with transmission rates in millions of bits per second. Tests in optimal conditions indicate speeds nearly twice as fast as 802.11g but the IEEE standards body is still hammering out the final details. As far as it's related to wireless networking, MIMO remains a work in progress.

MIMO IN THE MARKETPLACE

No one doubts that MIMO will be part of the 802.11n specification when that standard finally arrives, but the oft-used "Pre-N" label that some vendors have slapped on their routers has absolutely no real significance (except to differentiate a product from its predecessors). What's more, the MIMO research and development effort is proceeding in three directions: There's Airgo Networks' True MIMO, Atheros Communications' Super G and Super AG, and Video54's BeamFlex Smart MIMO.

Airgo CEO Greg Raleigh wrote the first academic paper on MIMO at Stanford in 1996 and has 26 patents in the field. Airgo is pushing a protocol called "spatial multiplexing," which uses multiple transceivers on each side. Don't get caught up in the terminology. It's just technese: Spatial because the multiple antennas are at different positions; multiplexing because more than one signal is being sent at the same time.

Airgo's True MIMO technology can handle multiple data streams at the same time and over the same frequency band. Theoretically, this should increase the throughput rate by whatever factor of radios there might be. Practically, it's never quite that neat.

Atheros uses a similar setup; its design, however, transmits the same data stream simultaneously, which neglects the spatial multiplexing factor.

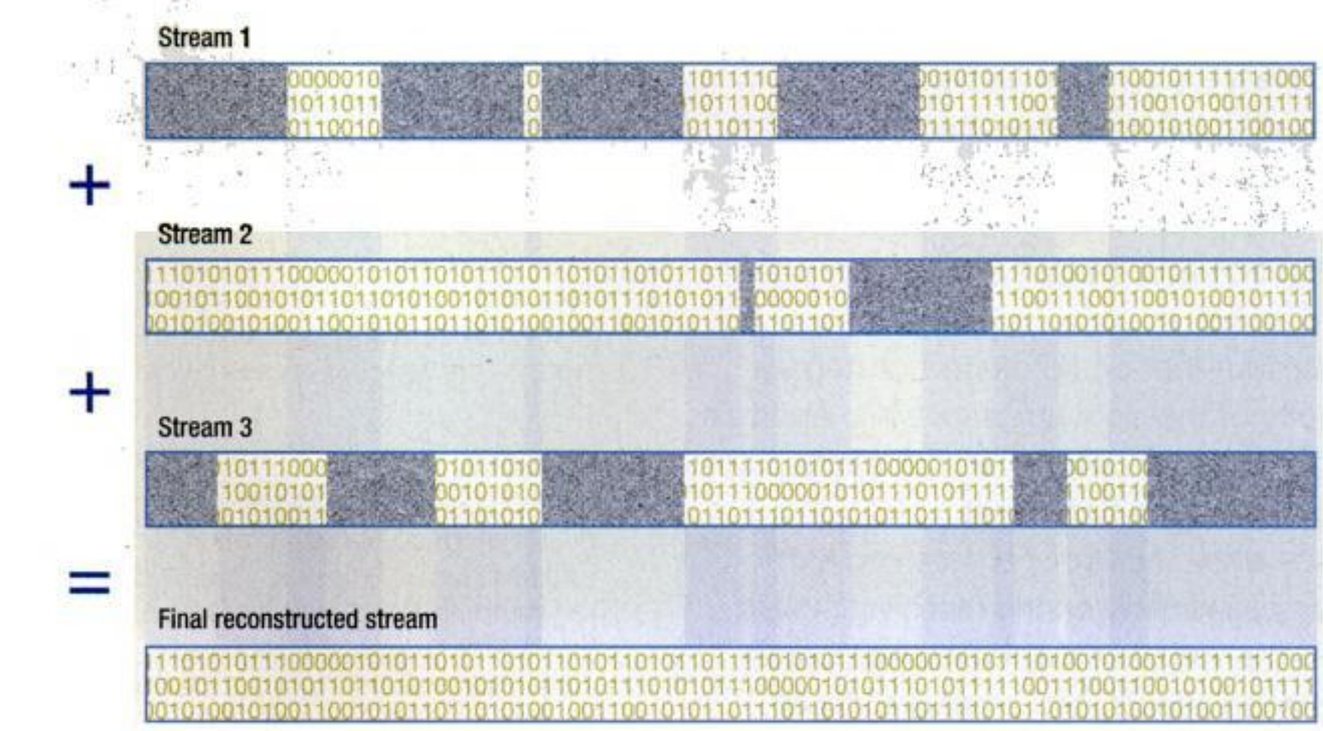
Video54 has taken a tack somewhere between the two: Its seven-antenna system can transmit the same data stream over multiple paths simultaneously, but it uses only one radio—again, without spatial multiplexing.

Needless to say, both Atheros and Video54 would like to eliminate spatial multiplexing as a requirement in the MIMO specification, maintaining that multiple antennas at both ends of the path are sufficient—while how they are used should be optional. The obvious advantage with fewer transceivers per device is a less complex and costly final package, and any loss of additional throughput, they claim, is marginal over time.

There are also some concerns about attempting to mix the various 802.11 schema and technologies. Although you'll be happily notified that you have 11 possible channels available (in the U.S.) when you scan for a Wi-Fi network connection, there are really only three channels—1, 6, and 11; all the other frequencies overlap with one or more of these three.

The one thing that's certain about current MIMO implementations is that no matter which technology they're based on, they're likely to bear little resemblance to the official 802.11n specification when it's finally released. If you want MIMO now, therefore, the operational rule of thumb is "you pays your money and you takes your chance." MPC

MIMO RECEPTION — Creating coherence from chaos



►Signal scattering caused by environmental obstacles leaves each transmission stream with a slightly different profile. Signal-processing firmware on the receiving side combines all the streams into a single coherent signal.

MORE ON WI-FI

Status of 802.11n Ratification

If you think the government is slow to act, you haven't monitored the glacial pace of the IEEE standards committees. The organization's 802.11n Task Group was formed in March 2003, but the 802.11n standard isn't expected to be ratified until the first quarter of 2007.

For a time, three proposals jockeyed for final certification: TGn Sync, supported by Atheros; WWiSE, advocated by Airgo; and MITMOT, backed by Motorola. After 14 hours of presentations and discussion during the 802.11n Task Group's January 2005 meeting, MITMOT was eliminated from consideration. In March 2005, the group eliminated WWiSE, leaving TGn Sync as the only remaining candidate. Unfortunately, TGn Sync failed to clear the next hurdle: approval from 75 percent of the group's membership.

At the Task Group's next meeting, in May 2005, TGn Sync's advocates addressed the concerns of members who had previously voted against their proposal; but after a second vote, TGn Sync still couldn't manage to obtain the required 75 percent approval. As dictated by the group's rules, this opened the door for both WWiSE and MITMOT to be reinstated for consideration.

When the group reconvened in July 2005, advocates of all three proposals reached a compromise and announced their intention to merge TGn Sync, WWiSE, and MITMOT into a fourth proposal, which will be presented to the 802.11n Task Group in September.

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PC Magazine Editor's Choice, April 2004

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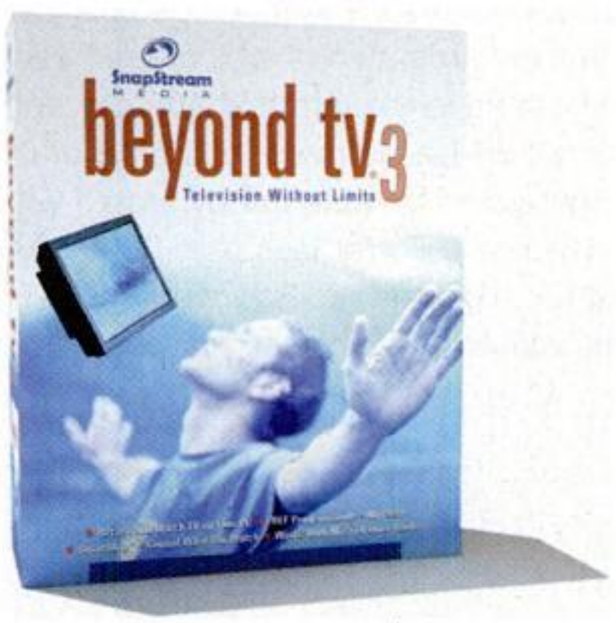

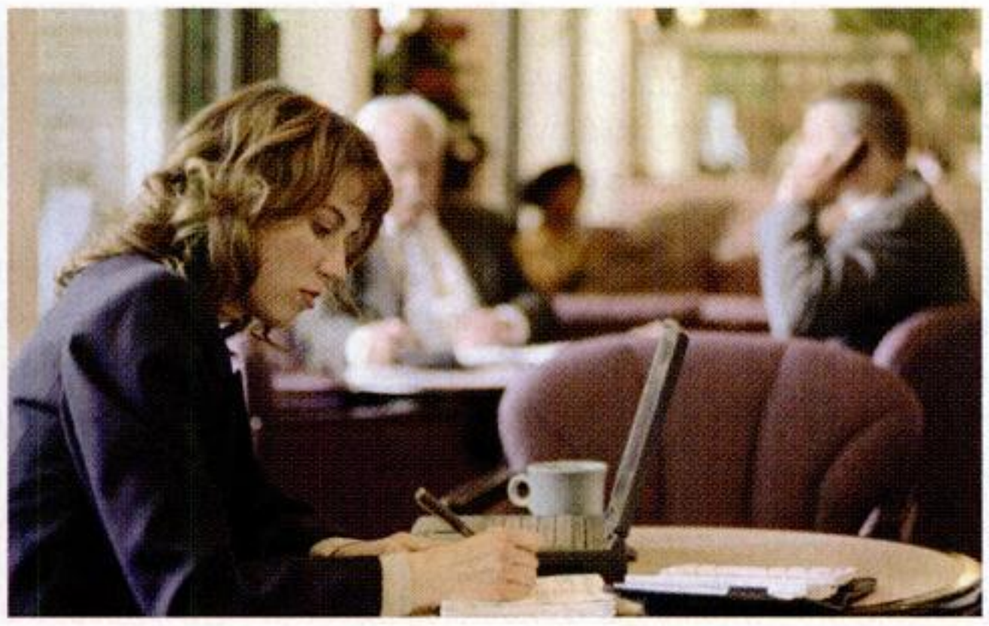

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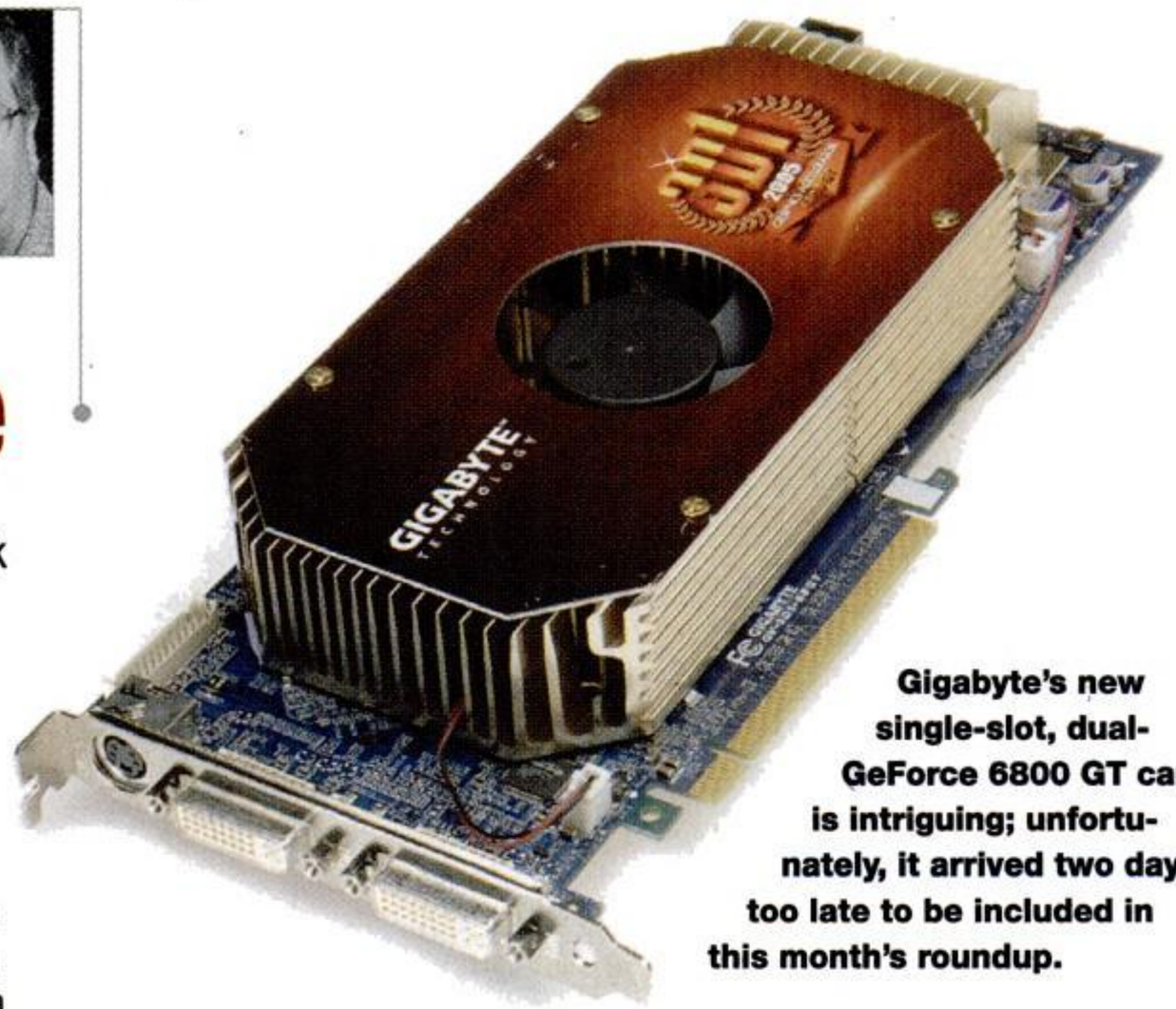
Michael Brown

Surveys the Videocard Scene

Benchmarking a battalion of videocards was a cakewalk compared to dealing with some reluctant vendors

This month's videocard roundup was planned in anticipation of ATI and nVidia shipping their next-generation GPUs. I was really looking forward to an epic battle, with the two most important companies in the PC graphics industry arming their partners to the teeth with powerful new silicon. Alas, the war was over with nary a shot fired. Unable to provide us with either an R520 GPU or a CrossFire dual-videocard setup, ATI pretty much folded its tents and skulked home.

In fact, one of my biggest challenges in producing this story was convincing ATI vendors to send cards for review. But I guess I can't blame them. If I was a videocard manufacturer staring down the double barrels of nVidia's GeForce 7800 GT and 7800 GTX, I'd leave my high-end Radeon cards in their holsters, too. ATI, Connect3D, and Sapphire Technology finally stepped up and supplied us with five cards, two of which fared very well in our benchmarks. Who'd have thought that you'd ever be able to buy a videocard with a 256-bit interface to 256MB of memory for less than $200? Or that you'd be able to buy a card with that much memory and a 16-pipe GPU for less than $300? As poorly as ATI has executed at the high end, its Radeon X800 GT and X800 XL GPUs are terrific values at their price points.



Gigabyte's new single-slot, dual-GeForce 6800 GT card is intriguing; unfortunately, it arrived two days too late to be included in this month's roundup.

Nonetheless, we all need ATI to pull out of its funk—and by "we" I mean consumers, videocard manufacturers, game developers, and even (as odd as it sounds) nVidia. Competition drives innovation, it keeps prices reasonable, and it moves the industry forward.

Speaking of innovation, I was disappointed that Gigabyte couldn't get me its GV-3D1-68GT in time to include in this month's roundup—the card showed up two days after I had to close the story. Unlike the GV-3D1 videocard/motherboard bundle I panned in our July 2005 issue, this single-slot, dual-GPU card will work in any PCI Express motherboard, according to Gigabyte. It's powered by two nVidia GeForce 6800 GT GPUs with dual 256MB frame buffers, and it's capable of driving up to four independent displays (via two DVI and two VGA ports). You can be sure I'll have a full review of this big boy in our next issue.

Logan Decker

Attempts to Rip DVDs Faster

Circumventing the speed restrictions of Plextor's Kick Ass PX-716A

With Plextor's PX-716 (in both the parallel and SATA versions) still at the top of our list for optical drives, I get a lot of angry emails about the slow ripping speed of the drive—sometimes about the audio ripping, but mostly about extracting the contents of DVD-Video. When I say "angry," I mean a string of expletives so creative and exotic it would make Trey Parker blush.

Plextor's drives have always leaned toward the conservative side, especially when it comes to ripping discs, emphasizing accuracy over speed. This almost always works to your advantage—do you really want to manually scan every audio CD rip for errors before you file the disc away? Or have your DVD recompression job stumble on a rip error two and a half hours into transcoding? What's more, the PX-716A restricts CSS-encrypted DVD-Video reading to 2x. No, this isn't to punish you Netflix "burn 'n' return" types—it's to minimize noise when you're watching movies.

Fortunately, you can disable this restriction using the bundled *Plextools* software. Launch *Plextools* by double-clicking the Plextor icon in the System Tray, select Drive Settings from the menu, click the Advance tab, and check the box next to Enable SpeedRead CD/DVD. If it's grayed out, update your drive's firmware and the *Plextools* software, both available at **www.plextor.com**. With SpeedRead enabled, a 4.13GB single-layer DVD that previously took 26:47 (min:sec) to extract was ripped in only 6:51 (min:sec). Now *that's* more like it!

It turns out there was nothing wrong with the video ripping on PX-716A drives—they were just running slow to maximize your rip quality.

Now I've got to go check my email, where I'm sure to begin receiving angry, expletive-filled messages from the Motion Picture Association of America.

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How We Test

Real-world benchmarks. Real-world results

Computer performance used to be measured with synthetic tests that had little or no bearing on real-world performance. Even worse, when hardware vendors started tailoring their drivers for these synthetic tests, the performance in actual games and applications sometimes dropped.

At *Maximum PC*, our mantra for testing has always been "real-world." We use tests that reflect tasks power users perform every single day. With that in mind, here are the six real-world benchmarks that we use to test every system we review.

SYSmark2004: This is the most comprehensive application benchmark available, using no fewer than 19 applications to measure the time it takes for the PC to complete to real-world computer-intensive tasks. Our *SYSmark* score is a composite based on the time the test takes to complete several different types of tasks.

Adobe Premiere Pro: The leading non-linear digital-video editor has recently been retooled with more support for multi-threading. We take a raw AVI file, add several transitions and a soundtrack, export it to a generic MPEG-2 file, and then report the time the script takes to complete.

Adobe Photoshop CS: We don't subscribe to Apple's half-baked idea that running one filter test in *Photoshop*, in one certain way, at a particular time of day provides an accurate measure of performance. Instead, we take a high-resolution image and throw it through just about every filter available in *Photoshop CS* at it. Our score is the time it takes for the script to complete.

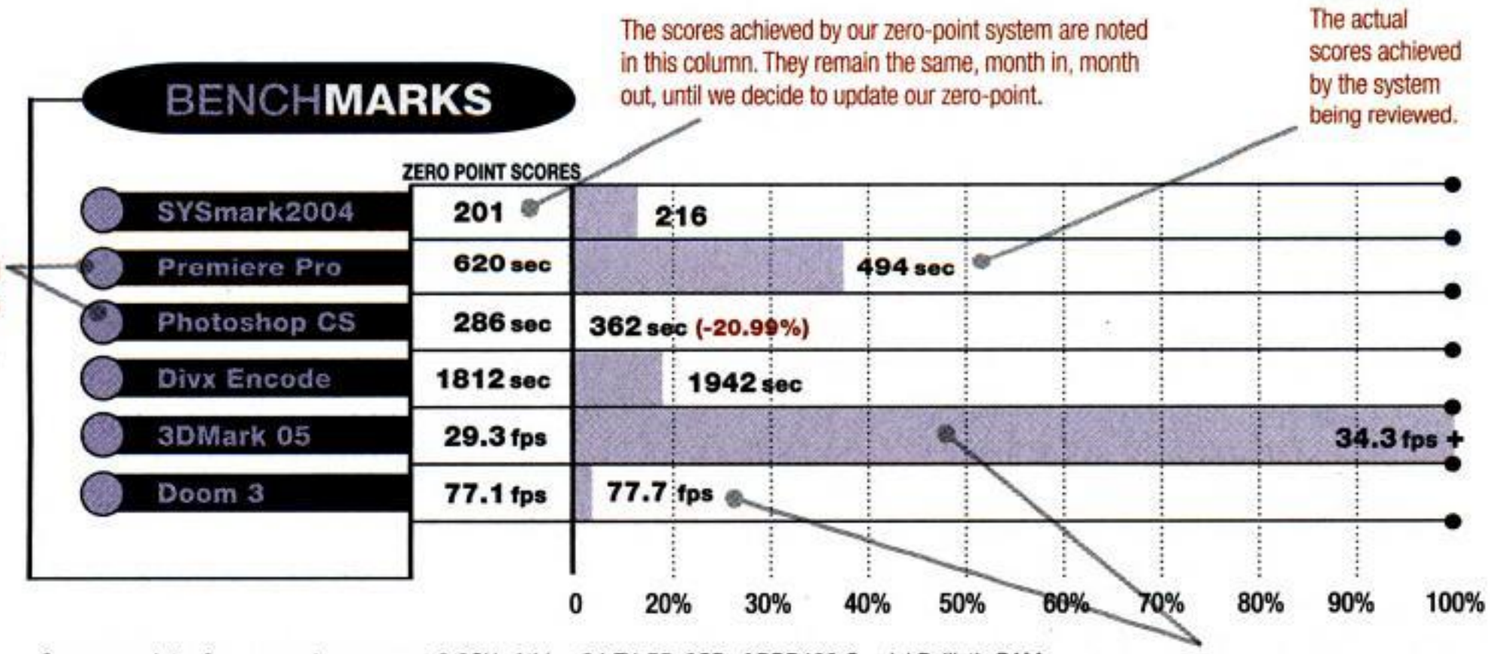
Divx Encode: Video encoding is today's time-suck. We transcode a short movie stored on the hard drive from MPEG-2 to Divx using *#1 DVD Ripper.* We report the length of time the process takes to complete.

3DMark05: After ranting about real-world tests, you might be surprised to find this "synthetic" graphics test in our suite. *3DMark05*, however, has proved to be the standard by which graphics cards and PCs that run them are judged. Instead of reporting a meaningless composite score, we run the third test at 1280x1024 with 4x antialiasing and 4x anisotropic filtering, then report the frame rate. Our zero-point system with SLI can't even break 30 frames per second.

Doom 3: Id's hugely popular game is a dark, scary, and serious test of PC horsepower. We run this game with 4x antialiasing and 4x anisotropic filtering, at 1600x1200 resolution, and report the frame rate.

How to Read Our Benchmark Chart

Maximum PC's test beds double as zero-point systems, against which all review systems are compared. Here's how to read our benchmark chart.


The scores achieved by our zero-point system are noted in this column. They remain the same, month in, month out, until we decide to update our zero-point.
The actual scores achieved by the system being reviewed.
BENCHMARKS
ZERO POINT SCORES
The names of the actual benchmarks used.
SYSmark2004
201
216
Premiere Pro
620 sec
494 sec
Photoshop CS
286 sec
362 sec (-20.99%)
Divx Encode
1812 sec
1942 sec
3DMark 05
29.3 fps
34.3 fps +
Doom 3
77.1 fps
77.7 fps
0
20%
30%
40%
50%
60%
70%
80%
90%
100%
Our zero-point reference systems uses a 2.6GHz Athlon 64 FX-55, 2GB of DDR400 Crucial Ballistix RAM, two nVidia GeForce 6800 Ultra cards in SLI, a Maxtor 250GB DiamondMax10, a Sound Blaster Audigy 2 ZS, a PC Power and Cooling TurboCool 510 Deluxe Express, and Windows XP Pro with SP2.
Every month we remind readers of our key zero-point components.
The bar graph indicates how much faster the review system performed in respect to the zero-point system. If a system exceeds the zero-point performance by more than 100 percent, the graph will show a full-width bar and a plus sign.

BEST OF THE BEST

Our monthly category-by-category list of our favorite products. New products are in red.

High-end videocard:
Asus GeForce N7800 GTX Top
This dual-slot card slays all other 7800 GTX cards we've seen

Midrange videocard:
XFX GeForce 6800GT
With the latest price cut, the 6800GT leaps to the front of the budget line

Soundcard:
Creative Labs X-Fi Extreme Music
Excellent headphone performance and overall fidelity make it the top soundcard

7,200rpm SATA:
Hitachi Deskstar 7K500

External backup drive:
Western Digital Dual-Option Media Center 250GB

Portable USB drive:
Seagate Portable External Hard Drive 100GB

DVD burner:
Plextor PX-716A

Widescreen LCD monitor:
Dell 2405FPW

Desktop LCD monitor:
Dell 2001FP

Socket 939 Athlon 64 mobo:
Asus A8N-SLI Deluxe

Socket 775 Pentium 4 mobo:
Asus P5ND2-SLI

Portable MP3 player:
Apple iPod 60GB

Photo printer:
Canon i9900

5.1 speakers:
Logitech Z-5500 Digital

2.1 speakers:
Klipsch GMX A2.1

Mid-tower case:
Cooler Master Praetorian 730

Full-size case:
ThermalTake Armor VA8000BWS

Games we're playing: FEAR demo, Dungeon Siege II, Battlefield 2, Grand Theft Auto: San Andreas

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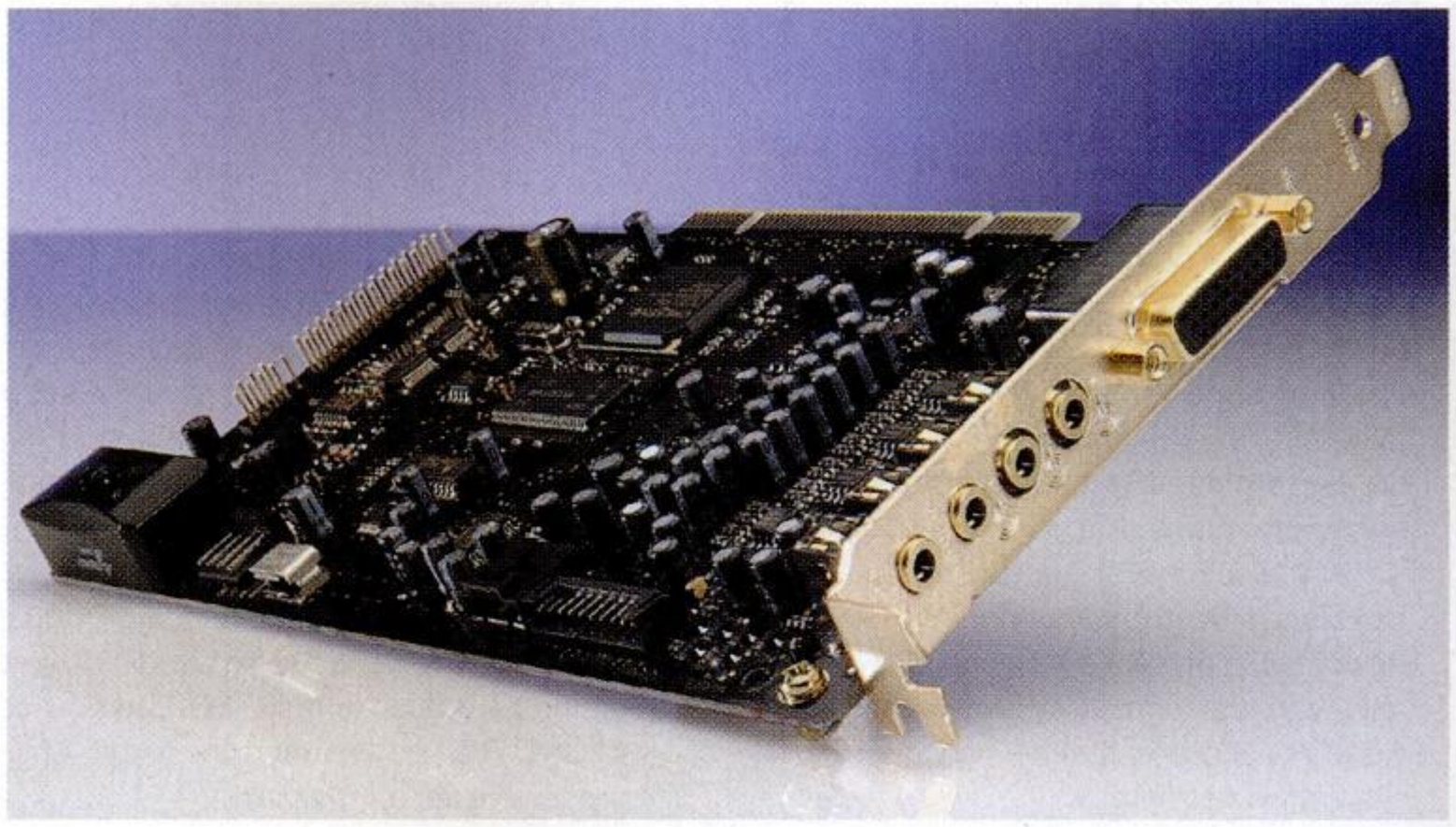
Creative Labs Sound Blaster X-Fi

The soundcard finally strikes back



All X-Fi cards pump out superb positional audio for gaming.

There's a Mafia-style war raging around your PC. The MPEG-2 decoder card? Found face down in a Dumpster. The LAN card? Gunned down as he was leaving the social club. And no one's seen the poor modem since he was "Hoffa'd" in the 1990s.

Who's responsible? All evidence points to the Host-based family, and none other than Don Processor himself, who has been consolidating power and resources on the motherboard for more than a decade now. After all, who the hell needs add-in cards when you can use the CPU to handle every PC chore?

Amid this upheaval, we didn't expect the soundcard to stick around, but boy has it, in the form of Creative Labs' audacious new Sound Blaster X-Fi series. Instead of knuckling under and going host-based like other soundcard makers, Creative spent money on a new DSP and architecture. With its 400MHz core speed, 51 million transistors and 10,000 MIPS, the X-Fi, according to Creative, has 24 times the power of an Audigy 2 ZS and equals the power of a 3.4GHz general-purpose CPU.

Creative is building the X-Fi into three distinct PCBs, with four versions of the card available at retail: The basic X-Fi XtremeMusic features a multichannel 24-bit Cirrus Logic DAC, a Wolfson 24-bit ADC, and 2MB of "XRAM." The X-Fi Platinum adds a bay adapter to the XtremeMusic's mix. The Fatal1ty FPS uses the same DACs as the XtremeMusic but ups the XRAM to 64MB and gives you a status LED. All three can hit 109dB SNR, which is just a tick better than the 2 ZS' 108dB. The Elite Pro can hit 116dB thanks to its higher-end AKM DAC. What's XRAM for? It will act as a local audio buffer eventually, but right now, it doesn't do much.

But enough about the hardware, what really matters is the sound. We tested the Fatal1ty FPS and XtremeMusic versions to see if Creative's new cards live up to the SNR claims. When compared with Intel's HD Audio, we can say there's no contest. In music and movies, the X-Fi sounded head-and-shoulders better than HD Audio. HD Audio's gaming performance was also inferior. In *Battlefield 2*, comm chatter sounded synthetic and the positional effect was piss-poor. With the X-Fi, a tank's engine rumble was occluded when it moved around a corner to the other side of a building. We could even discern an audible difference when running with our "face" forward or pointed at the ground. That's the strength of the X-Fi, which is the first card to combine technology from Aureal, Sensaura, and Creative. As you'd expect from that kind of pedigree, it sounds fantastic.

Furthermore, we experienced actual game hitches in *Battlefield 2* with HD Audio. With the X-Fi, there were none. Why? We suspect that 16 bots plus audio chores is

The X-Fi Fatal1ty FPS tosses in a drive bay and a remote.

BENCHMARKS

	X-FI	HD AUDIO	HD AUDIO DDL
3DMARK 2003 0 SOUNDS (FPS)	98.5	99.9	92.0
3DMARK 2003 24 SOUNDS (FPS)	84.6	84.5	79.4
QUAKE III (FPS)	388	382	355

Test system: 3.73GHz P4EE, Asus P5WD, GeForce 6800 Ultra, 1GB DDR2/667.

SPECS

X-FI CARD	PORTS	FEATURES	ACCESSORIES	PRICE
XTREMEMUSIC	3 line-out, 1 combo mic-in, line-in, digital I/O	Cirrus Logic CS4382 DAC, Wolfson WM8775 ADC. Rated at 109dB. 2MB of XRAM	N/A	$130
PLATINUM	3 line-out, 1 combo mic-in, line-in, digital I/O. Bay adapter: MIDI-in and -out, line-in, mic-in, aux-in, headphone, SPDIF-in and -out, optical-in and -out	Cirrus Logic CS4382 DAC, Wolfson WM8775 ADC. Rated at 109dB. 2MB of XRAM	5.25-inch bay adapter with audio ports, remote control	$200
FATAL1TY FPS	3 line out, 1 combo mic-in, line-in, digital I/O. Bay adapter: MIDI in and out, line in, mic-in, aux-in, headphone, SPDIF-in and -out, optical-in and -out	Cirrus Logic CS4382 DAC, Wolfson WM8775 ADC. Rated at 109dB. 64MB of XRAM.	5.25-inch bay adapter with audio ports, remote control	$280
X-FI ELITE PRO	3 line-out, 1 combo mic-in, line-in, digital I/O. External console: aux-in and -out, DIN, MIDI-in and -out, optical-in and -out, line-in/mic-in, line-in, hi-z, headphones	Higher quality CS4398 ADC and AKM 5394AVS DAC. Rated at 116dB signal to noise ratio. 64MB of XRAM	External bay, remote control, RIAA preamp for recording from records	$400

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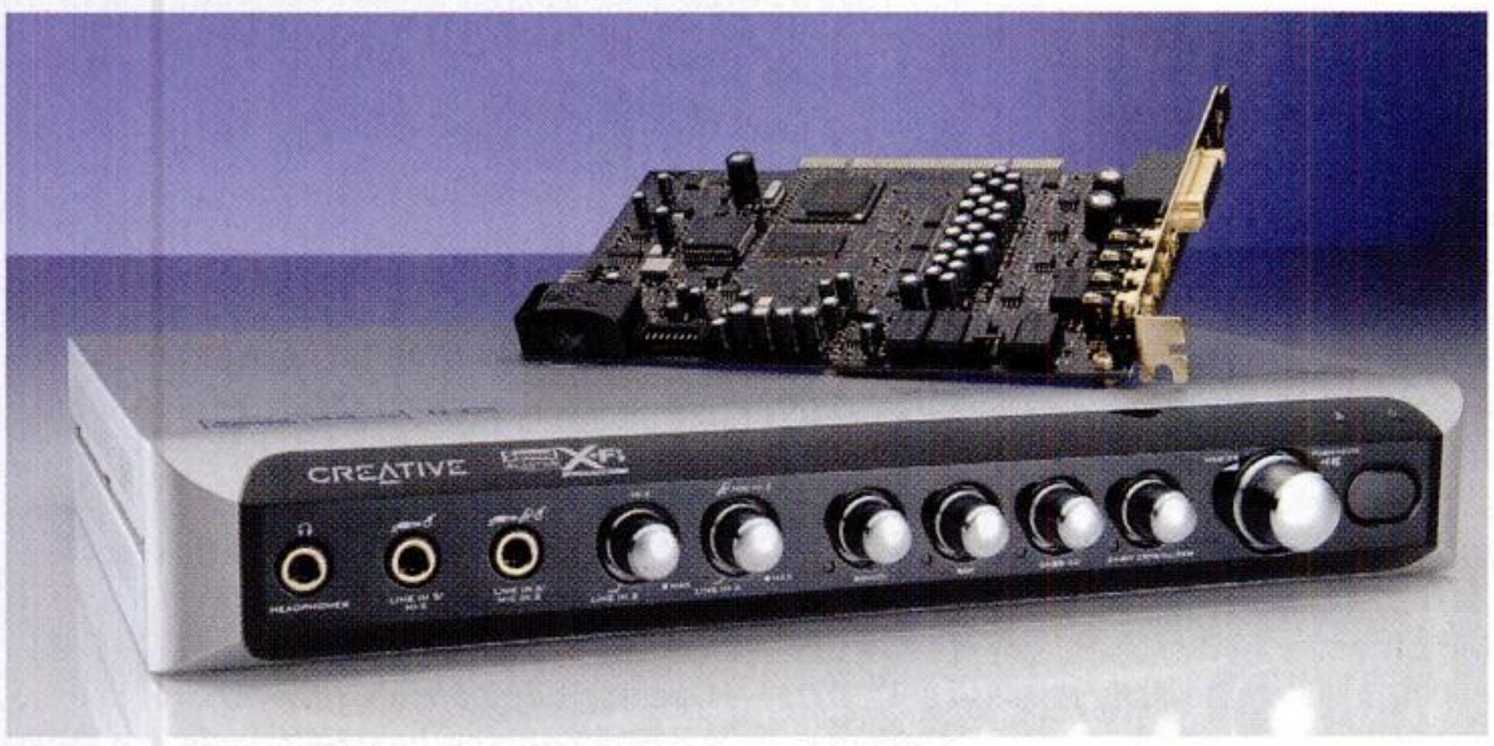
too much for the CPU. With the X-Fi, you get better audio and frame rates.

So where does that leave Audigy 2 ZS owners? If you use speakers, the differences are probably too subtle to make the upgrade worthwhile. With headphones, however, an upgrade yields noticeably improved sound. Also in the X-Fi's favor is the ability play up to 128 audio streams in such games as *Battlefield 2* at the highest quality setting. That might sound like overkill, but on a 64-person server, the game will generate more than the 64 audio streams the 2 ZS is capable of.

Mind you, the X-Fi isn't perfect. We're disappointed we can't tune headphone acoustics like we could on many Sensaura parts. On the base XtremeMusic card, you can't even program the jacks to support headphones and a set of speakers simultaneously. And we definitely don't think the extra RAM and pointless LED in the Fatal1ty FPS card are worth the extra cash.

Still, it's hard to foresee anyone making a better all-purpose soundcard than the X-Fi series in the near future. Despite predictions of its death, it's pretty clear to us that the soundcard is still alive and kicking. Bada Bing!

—GORDON MAH UNG



The X-Fi Elite Pro breaks the bank but gives you a break-out box with an RIAA preamp.

CREATIVE LABS X-FI

ROLLING STONES

Headphone gaming doesn't get any better than this.

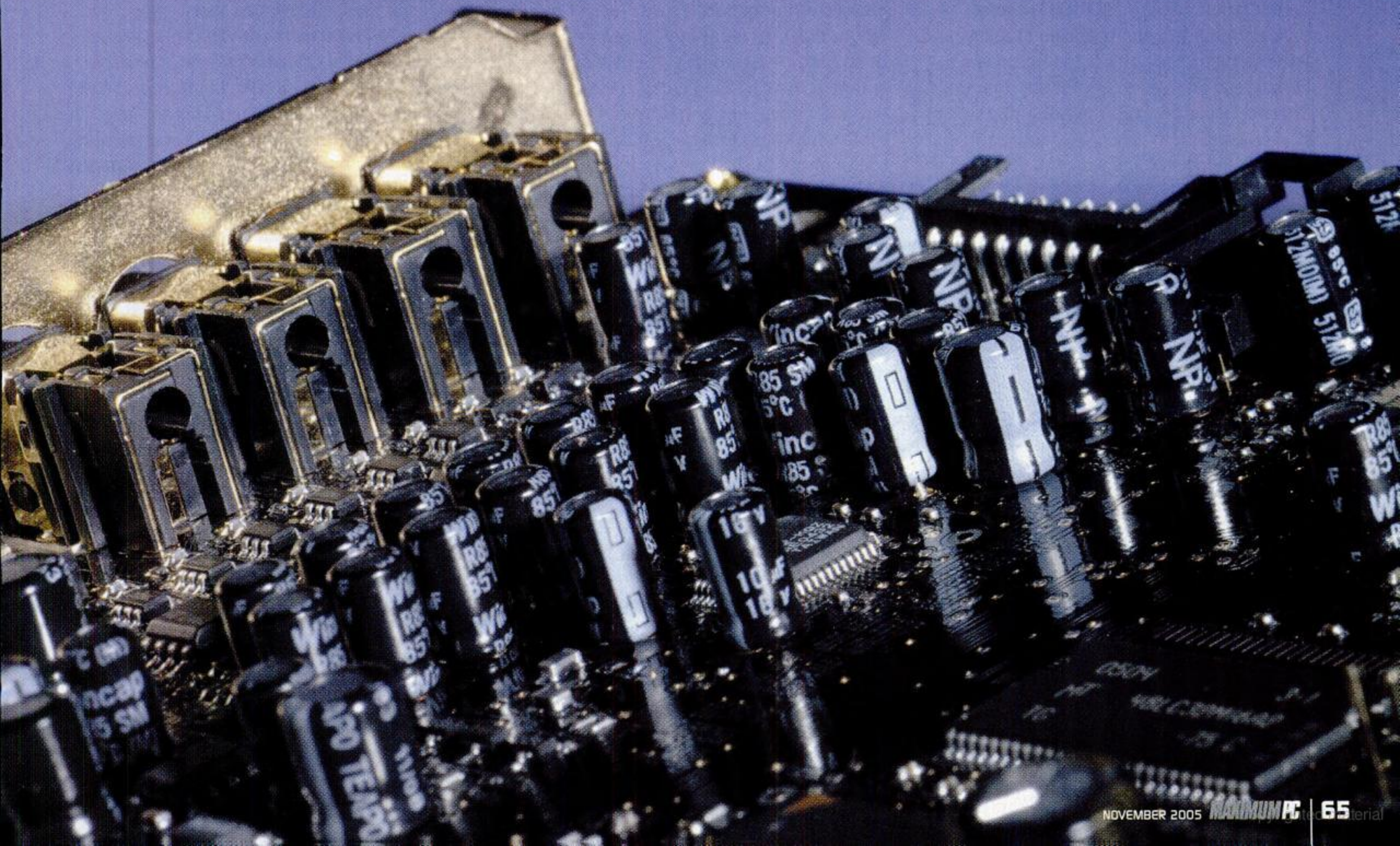
GALL STONES

Painful pricing, and where's the FireWire?

9

MAXIMUM PC KICKASS

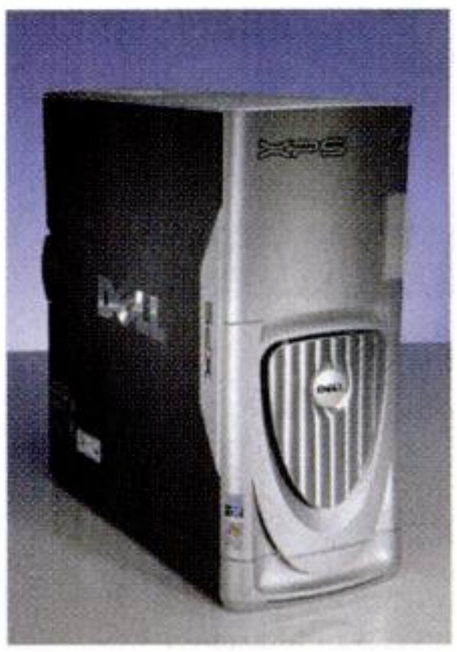
$130, www.soundblaster.com



Dell XPS 600

Dell outfits its premier gaming rig with the nVidia's new X16 chipset

Dell can recognize a hot market when it sees it. With its sixth-generation supreme gaming box, Dell is out to prove that it's damned serious about gamers. Don't believe it? Check out the hardware in this rig.



Dell's XPS is the first system we've tested that sports two x16 PCI Express graphics lanes, which is impressive—even though the Dream Machine had dual x16 slots months ago. We're not surprised Dell adopted SLI for this version of the XPS—the fifth-gen XPS and its single Radeon X850 XT were smacked around by the SLI rigs in our July review—but the XPS delivers SLI with surprising panache.

The secret sauce in this XPS is the dual nVidia GeForce 7800 GTX cards. The cards are full-length for added stability, and feature custom, double-wide heatsinks to keep them cool, even on hot summer days. Thanks to the new nForce4 SLI Intel Edition X16 chipset, both cards can run in a full x16 PCI Express configuration. Previous iterations of SLI (on Intel and AMD) allowed only x8/x8 or x16/x4 channel configurations.

Although dual x16 PCI Express sounds great, it means little for today's gamers. Current games don't use the 8GB/s of bandwidth provided by an x8 PCI-E slot. That doesn't mean tomorrow's games and cards won't take advantage of the bandwidth, but for gaming today, we're more excited by the custom-cooled 7800 GTX boards.

Version six is Dell's lucky number. With SLI support and a pair of GeForce 7800 GTX boards, the latest XPS is a force to be reckoned with.

The XPS also includes a P4 670 with 2MB of cache, 1GB of DDR2/667 RAM, a pair of 500GB Hitachi Deskstar drives in a RAID 0 array, a Sound Blaster Audigy 2 ZS Platinum card, and a dual-tuner TV card. Dell loaded our XPS with Windows Media Center 2005. Why MCE? Dell says the machine is a multi-purpose box, not just a gaming machine.

While it didn't blow the competition out of the water, the XPS did manage to hold its own in benchmarks. We weren't sure where the XPS would fall in the applications test, *SYSmark 2004*, but it chimed in with a score of 231. That's the fourth highest score this year and about 15 percent faster than our zero-point FX-55 box—not too shabby! In *Premiere Pro*, the P4-equipped XPS sailed past all the Athlon boxes, including the FX-57 machines. And in our Divx compression benchmark, the XPS is the fastest stock-clocked machine we've ever tested—if you discount the Falcon Northwest Mach V and its downright illegal overclock of 4.25GHz (reviewed in May).

Overall, the Dell is sitting pretty in applications. But what about games?

Even though the Monarch and Hypersonic systems we reviewed this fall featured the same 7800 GTX cards, the XPS turned in scores about 10 percent slower. Why? We blame the Pentium CPU. The Athlon FX-57 is a monster in gaming and the 3.8GHz P4 is no match. The scores aren't bad—in fact, the XPS nudged past our 2005 Dream Machine in *Doom 3*—but they're certainly not the fastest we've seen.

The XPS 600 marks the first time Dell has used a non-Intel chipset in a consumer desktop PC, which is significant, but the company will have to boot the Pentium 4 for an Athlon 64 if it wants to truly get serious about gaming.

—CLAUDE MCIVER

UNDER THE HOOD

BRAINS

CPU	Intel Pentium 4 670 (3.8GHz, 2MB L2)
MOBO	Custom Dell nForce4 SLI Intel Edition X16
RAM	1GB DDR2/667
LAN	Gigabit Ethernet
HARD DRIVES	Two 500GB Hitachi 7K500 Deskstar in RAID 0
OPTICAL	DVD+RW NEC ND-3530A, DVD-ROM TSST TS-H352C

BEAUTY

VIDEOCARD	Two GeForce 7800 GTX 256MB in SLI (430MHz core, 600MHz GDDR3)
SOUNDCARD	Creative Labs Audigy 2 ZS
CASE	Custom clamshell case

BOOT: 30 sec. **DOWN:** 13 sec.

DELL XPS 600

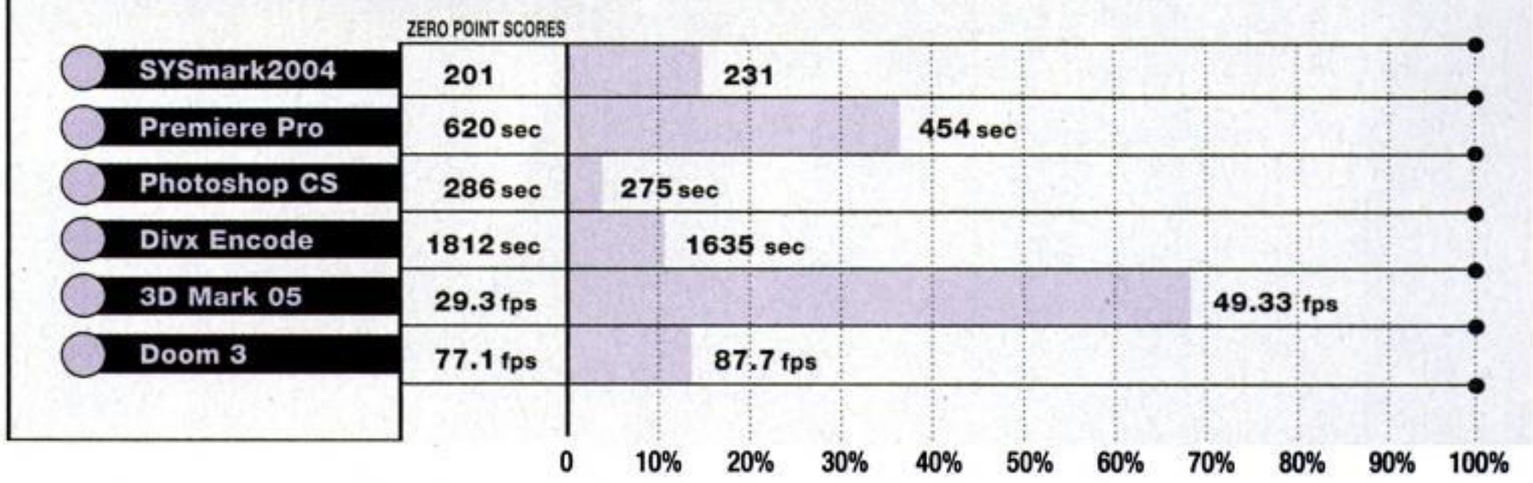
+ NEXT GEN
nForce4 X16 chipset, fast single-core processor, and super quiet.

− GEN X
A plastic case doesn't keep this rig from being heavy.

9

$4,000, www.dell.com

BENCHMARKS



Our zero-point reference systems uses a 2.6GHz Athlon 64 FX-55, 2GB of DDR400 Crucial Ballistix RAM, two nVidia GeForce 6800 Ultra cards in SLI, a Maxtor 250GB DiamondMax10, a Sound Blaster Audigy 2 ZS, a PC Power and Cooling TurboCool 510 Deluxe Express, and Windows XP Pro with SP2.

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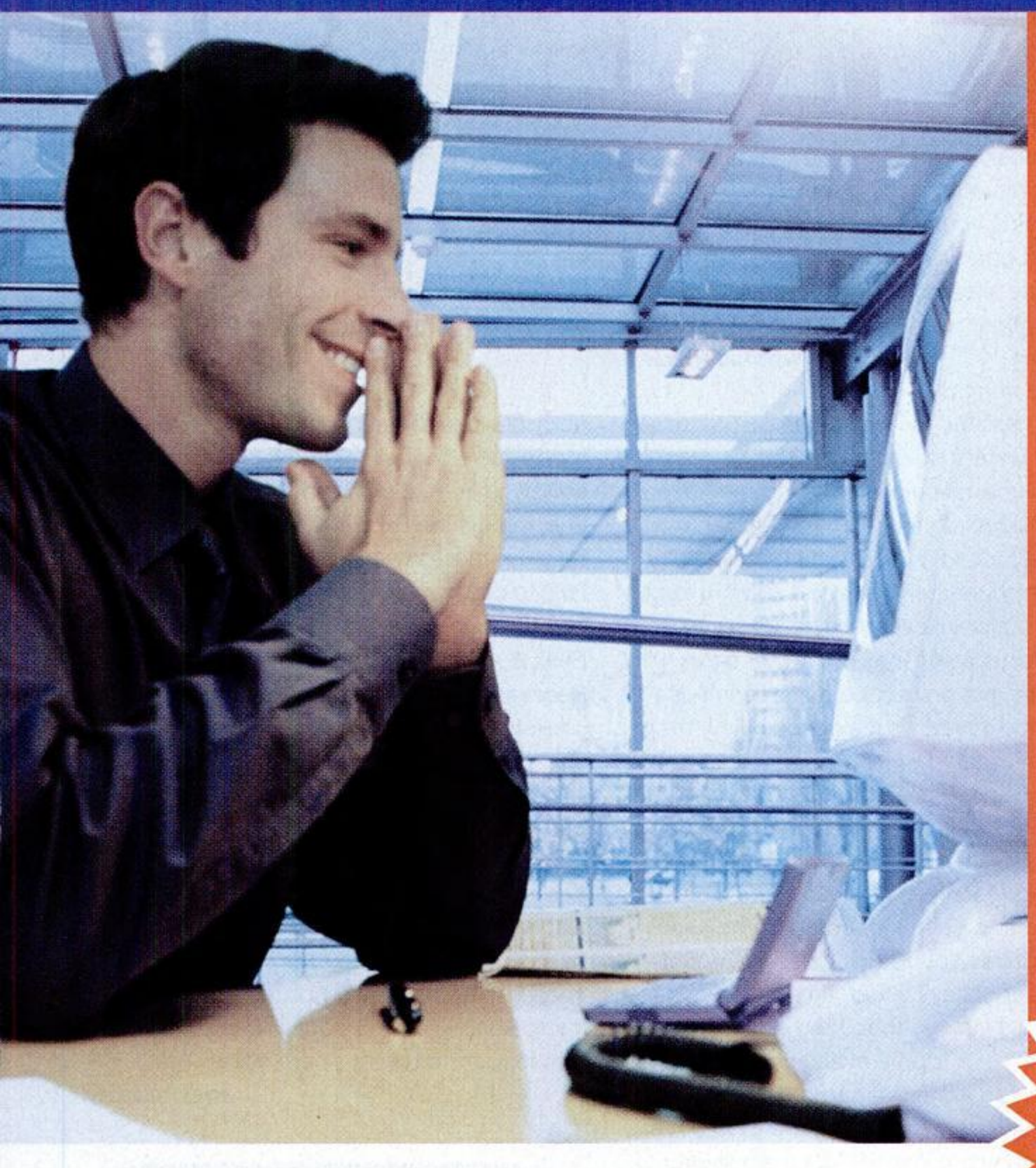

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Innovatek SET Passive Water-Cooling Kit

Actually, this cooling kit does have fans—us!

We all know that water conducts heat much more efficiently than air, but is it so effective that a water-cooling kit can run without any fans? That's what we wanted to test with Innovatek's SET passive water-cooling kit, which foregoes the standard radiator/fan setup in exchange for a massive external radiator that can either be bolted to the side of your case or stand on its own little feet. We expected the passive cooler to run super hot and cause instability with our test system, but we were totally wrong.

As stated previously, the radiator is passive, meaning it moves heat from the system and out of its heat exchanger without using fans. In a typical fan-based setup, water flows through tiny channels in a radiator and the heat moves from the water into the cooling fins. A fan blows cool air over the fins in order to blast heat out of the system. With smaller radiators, or radiators placed inside a case, a fan is absolutely necessary in order to dissipate heat from the radiator, but with a huge external radiator, a fan isn't needed—after all, the device isn't surrounded by smoldering hardware. External radiators are also sublimely easy to set up (just set it on your desk), don't occupy precious space inside your case, and operate in absolute silence thanks to their fanless nature.

Amazingly, Innovatek's SET kit was able to keep our FX-55 and WD Raptor hard drive totally cool under full load, without any fans whatsoever.

Aside from its beautiful radiator, the rest of the SET kit uses standard water-cooling parts. The XX-Flow CPU cooler is ridiculously easy to mount, though it does require motherboard removal. We also attached a Micro II hard drive water block, which mounts below the drive. It kept our WD Raptor lukewarm, even under a full load. Unfortunately, the HDD water block will only mount in a drive cage that doesn't use slots for the drives, as it extends below the allotted drive space.

In our circuit, water flowed from the pump to the radiator, then to the CPU block, onto the HDD block, and then back to the 12V pump/reservoir. The instructions call for the pump to be hard-mounted to the case, which requires you to drill holes in the bottom of your case. Though time-consuming, this method insures that the pump won't vibrate, shift, or topple over, and it's better than using an adhesive pad that will muck up your case should you decide to remove the kit some day. The SET kit uses skinny ¼-inch tubing, which sacrifices all-out cooling performance for easier tube routing and less susceptibility to kinking. Tubes attach to blocks via screw-on compression fittings that are simple to operate.

As our benchmarks show, the SET kit performs impressively. Its full-load temp of 50 C is totally acceptable, and its 13 C delta from idle to load is fantastic. The kit even goes toe-to-toe with the $400 Koolance Exos 2 (reviewed in August), which is also an external unit, though the Exos has an unfair advantage because it uses two 12cm adjustable-speed fans to cool a massive radiator. To keep it fair, we're only comparing the temps from the Exos 2 with its fans set to their lowest speed. Because the SET kit doesn't support LGA775 sockets, we couldn't test it on our regular Intel-based test bed, only on our Athlon 64 rig.

Our only complaint is that while we had no trouble configuring the kit, a beginner could be confused by the bewildering instructions; they're mostly text with very few photos and diagrams. Its overclocking performance wasn't super impressive, but that's not the kit's goal—it's to keep your PC cool and quiet, *and* in this respect it totally succeeds.

—JOSH NOREM

This top-down shot of the radiator shows the cooling fins that shoot out from each of the convection columns. Because of the radiator's massive size and the generous surface area of the fins, it's able to radiate a lot of heat.

INNOVATEK SET

+ COPPER BLOCK

Totally silent, great performance, easy to install, and elegant.

− COPPER ON YOUR TAIL

Instructions are not newb-friendly; pricey.

9

$260 ($100 for HDD block), www.frozencpu.com

BENCHMARKS

	INNOVATEK SET	KOOLANCE EXOS 2	STOCK HEATSINK/FAN
AMD FX-55			
IDLE (C)	37	36	**34**
100 % LOAD (C)	50	52	**49**
OVERCLOCKED TO	2.75GHz	N/A	2.70GHz

Best scores are bolded. All temperatures were measured from the onboard sensors using the utilities provided by the motherboard manufacturer. Idle temperatures were measured after 30 minutes of inactivity and full-load temps were achieved by running CPU Burn-in for one hour.

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Total Annual Cost	**$5.99**	**$9.20**	**$9.95**

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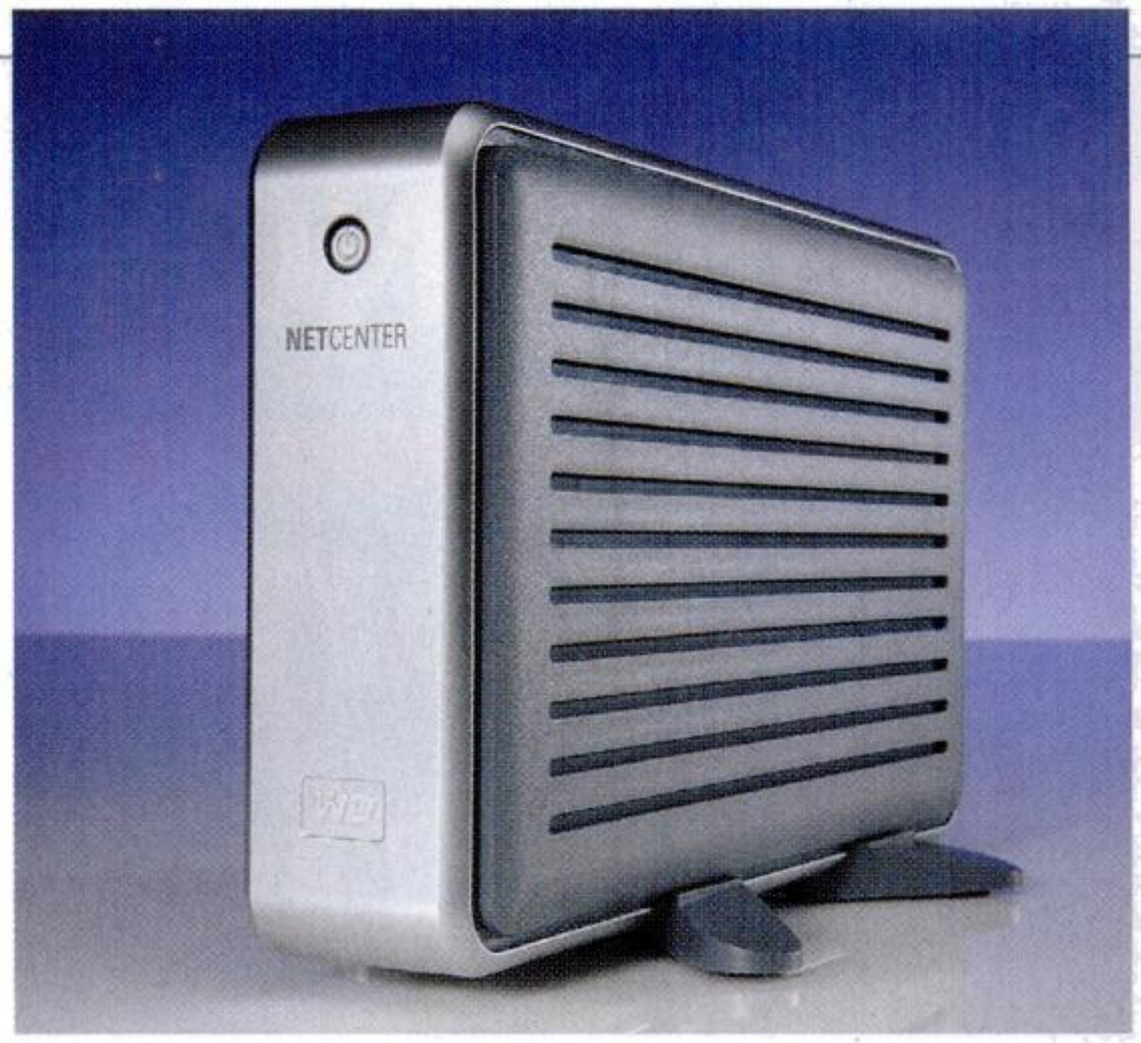
Let's Get NAS-ty

Data sharing and backup are just an Ethernet cable away

If your home office resembles a data center more than an office, you're probably ready for a network attached storage (NAS) unit. That's essentially a hard drive enclosure that hooks directly to your network, giving you and others in your home a place to store and share files. And because they're not much larger than a hard drive, NAS units are unobtrusive and can quietly run 24/7 without requiring a file server that sucks power all day.

—GORDON MAH UNG

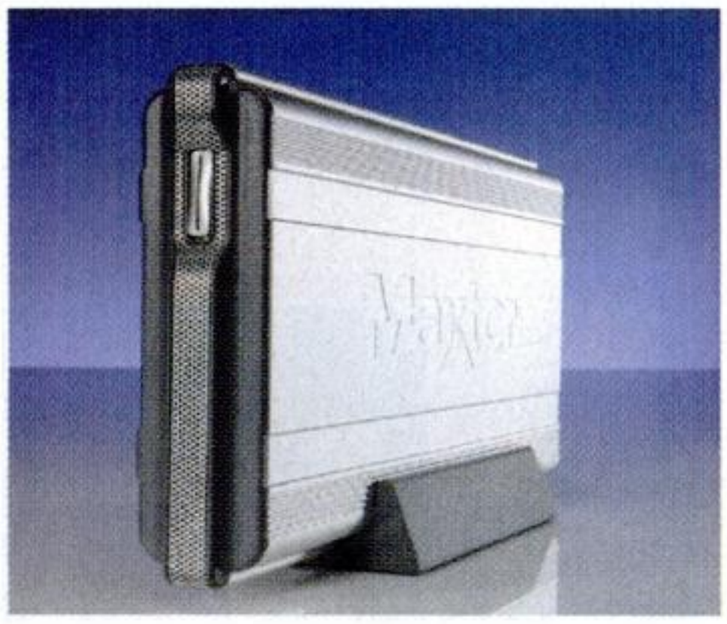


WD's NetCenter is priced well but lacks built-in backup capabilities.

MAXTOR SHARED STORAGE DRIVE

If Maxtor's Shared Storage Drive seems like just a longer version of the company's external USB 2.0 hard drive, that's because it is. In other words, the hard drive enclosure includes a controller board that adds Ethernet support. OK, it's not quite *that* simple, but you get the gist. In fact, Maxtor strives to make consumer NAS uncomplicated. Plug the device into a network with DHCP support, insert the CD, and—*wham!*—you're up and running with a shared drive that any computer on your LAN can access, with the proper password. The USB ports let you share a USB printer on your network, or plug in a USB key or hard drive for additional network storage.

Unfortunately, none of the NAS units here support writing to NTFS, only FAT32 or Linux partitions. That's a problem for people who want to share data from an already formatted hard drive. The Shared Storage's hard drive has a 300GB capacity, 7,200rpm spindle speed, and a 16MB cache. Performance with the Shared Storage wasn't stellar, but it was a good deal better than with the USB NAS adapters we tested last year (September 2004), which were painfully slow. When you factor in the simplicity of getting set up, the Shared Storage Drive makes for an easy, entry-level way to get network storage.



Maxtor's Shared Storage Drive is slim in size and features.

MAXTOR SHARED STORAGE

+ RIO BRAVO

Style and simplicity in a tiny little package.

− RIO LOBO

No automated backup ability, and lacks Gigabit Ethernet.

7

$400, www.maxtor.com

WESTERN DIGITAL NETCENTER

If your primary business is selling hard drives, it doesn't take long to figure out that network attached storage is an easy way to push more product. Hence, WD's NetCenter, which uses the company's newly minted 320GB 7,200rpm drive. The drive is comparable to the others here, but what really determines a NAS unit's performance is the controller chip and network connection.

To be honest, we didn't expect a significant performance differences between the WD NetCenter and the Maxtor Shared Storage, because we strongly suspect that both are based on the same chipset. And true enough, the two drives turned out the exact same throughput score in *SiSoft Sandra 2005*.

For a more real world test, we also copied several gigabytes of data to the device. Here, too, both were virtually identical, given the margin of error in file transfer tests. Like the Shared Storage, the NetCenter was a snap to install.

Our main complaint with the NetCenter, as with Maxtor's Shared Storage, is its backup capabilities. The firmware on our unit didn't give us the option to automatically back up the drive's contents to a secondary drive hooked up to one of the USB ports. That's a shame, as a NAS unit should have some form of redundancy. Neither the WD nor Maxtor units support FTP, or any multimedia streaming formats, either.

Are these horrible deficiencies? Not when you consider the price and convenience. If you want something more than a simple hard drive enclosure with a NAS module soldered onto it, you'll have to pay much more for it, as the other two products here demonstrate.

WESTERN DIGITAL NETCENTER

+ WILD BUNCH

Packs 320GB into a quiet package that fits on a bookshelf.

− BRADY BUNCH

Doesn't allow automatic backups to another drive.

7

$400, www.westerndigital.com

LINKSYS EFG250

Linksys' EFG250 is what you'd expect a NAS unit to look like. Its tall good looks, front-facing hard drive drawers, and LED lights tell you something important is going on in your data center, err, office.

Unfortunately, of the four units we

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tested, the EFG250 was by far the loudest. The unit features a thermal alarm, so why not use it to spool down the fans?

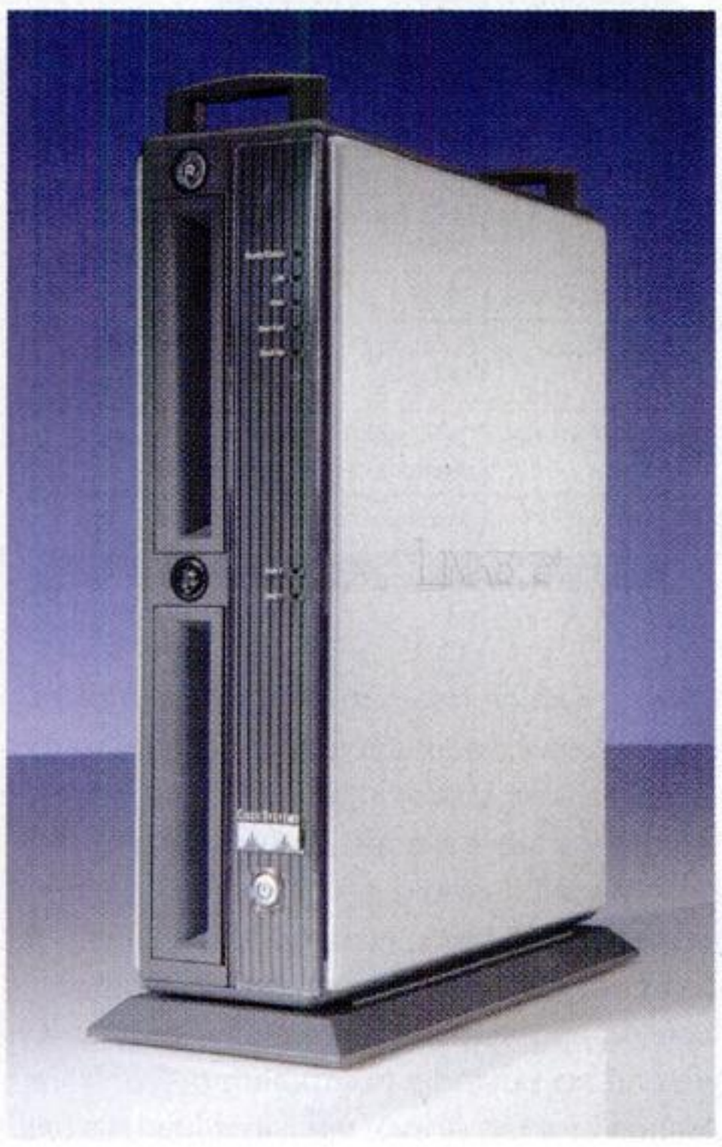
The EFG250 is certainly more capable than the WD and Maxtor units. It supports FTP transfers, and can function as a DHCP server as well. Pop a second parallel ATA drive into the second drawer and you can order it to perform nightly backups of the 250GB drive that comes with the unit. We would have liked a RAID option, but there is an advantage to a timed backup system. If you delete a file on the server, you can at least go to the backup. On RAID 1, nuke the files and it's instantly gone.

Performance of the unit was quite good in the real-world file-copy test. The EFG250 surprised us by slightly outpacing the Infrant ReadyNAS X6 (reviewed next) in simple file copies. In actual hard drive benchmarks, though, the ReadyNAS X6's RAID 5 configuration proved to be the fastest. Because the EFG250 and the ReadyNAS X6 are the only units here with Gigabit Ethernet, both easily smoked the Western Digital and Maxtor units.

But alas, the Linksys EFG250 was the only unit to give us configuration problems. By default, the unit is configured with a static IP address, and the Linksys configuration utility could not locate the unit on our switch. We solved the problem, but it shouldn't have occurred in the first place.

If you're looking for a NAS unit that sports more capabilities then a simple HD enclosure on steroids, the EFG250 is a good place to start.

The Infrant ReadyNAS X6 is far more sophisticated than the other NAS units tested here.



The Linksys EFG250 whines like a banshee.

LINKSYS EFG250

MAGNIFICENT SEVEN

Gigabit Ethernet offers double the performance of the Maxtor and WD units.

7 BRIDES FOR 7 BROTHERS

Doesn't support SATA drives or USB printers, and it's pricey.

8

$900, www.linksys.com

INFRANT READYNAS X6

While the other three NAS units here are suitable for average consumers, Infrant's ReadyNAS X6 is a product designed for geeks.

Resembling a home-brew mini PC more than a mass-produced NAS box, the ReadyNAS X6 gives you more flexibility than the other three units tested here. The cabinet supports up to four SATA drives and can actually be purchased bare-bones.

In the BYO drive config, the cost is $600. Equipped with 1TB of storage, the price hits $1,300, and for 1.6TB, you'll shell out about $1,900. We reviewed the 1TB version with four RAID Edition WD drives running RAID 5. If one drive pukes, you can replace it with another and keep going—the ReadyNAS X6 will take a few hours to rebuild the array, but you can continue to use it to access the data.

The ReadyNAS X6 supports a wealth of remote access protocols including FTP and HTTP, and you can even run a Squeezebox streaming-music box off of the unit. If you run the ReadyNAS X6 on a UPS, the unit is capable of shutting down and emailing you when the battery is out or a drive is failing.

In our file-copy test, the ReadyNAS X6 easily outran the Maxtor and WD devices, but was slightly edged by the Linksys EFG250. Why? The ReadyNAS X6 uses a journaling file system to make recovery of data faster at the cost of disk performance. While the ReadyNAS X6 and our host PC support jumbo frames, our D-Link Gigabit switch did not. With a more robust switch, we suspect we'd see better performance from the X6.

Our main complaint is with the lack of drive drawers, which would make a drive swap easier. We also would like more meaningful status lights instead of the Captain Pike-style ones on the box. That's not a lot to bitch about. The bare-bones ReadyNAS X6 with a single 250GB SATA drive is priced in the neighborhood of the Linksys EFG250. But the ReadyNAS X6 gives you far more features and expandability.

INFRANT READYNAS X6

BONANZA

Surprisingly quiet, robust controls, and flexible drive support.

TONY DANZA

Removing drives is a bitch, and it lacks hot-swapping capability.

9

MAXIMUM PC KICKASS

$1,300, www.infrant.com

BENCHMARKS

	FILE COPY (min:sec)	SiSOFT SANDRA 2005 LITE
MAXTOR	9:17	7MB/s
WESTERN DIGITAL	8:54	7MB/s
LINKSYS	**4:46**	11MB/s
INFRANT	5:08	**23MB/s**

How we tested: We hooked up all four NAS units to a D-Link Gigabit switch and copied 3GB of data files from a 3.8GHz P4 570 machine equipped with Gigabit Ethernet. We also mounted each NAS unit as a network drive and ran SiSoft Sandra 2005's hard drive benchmark across the network.

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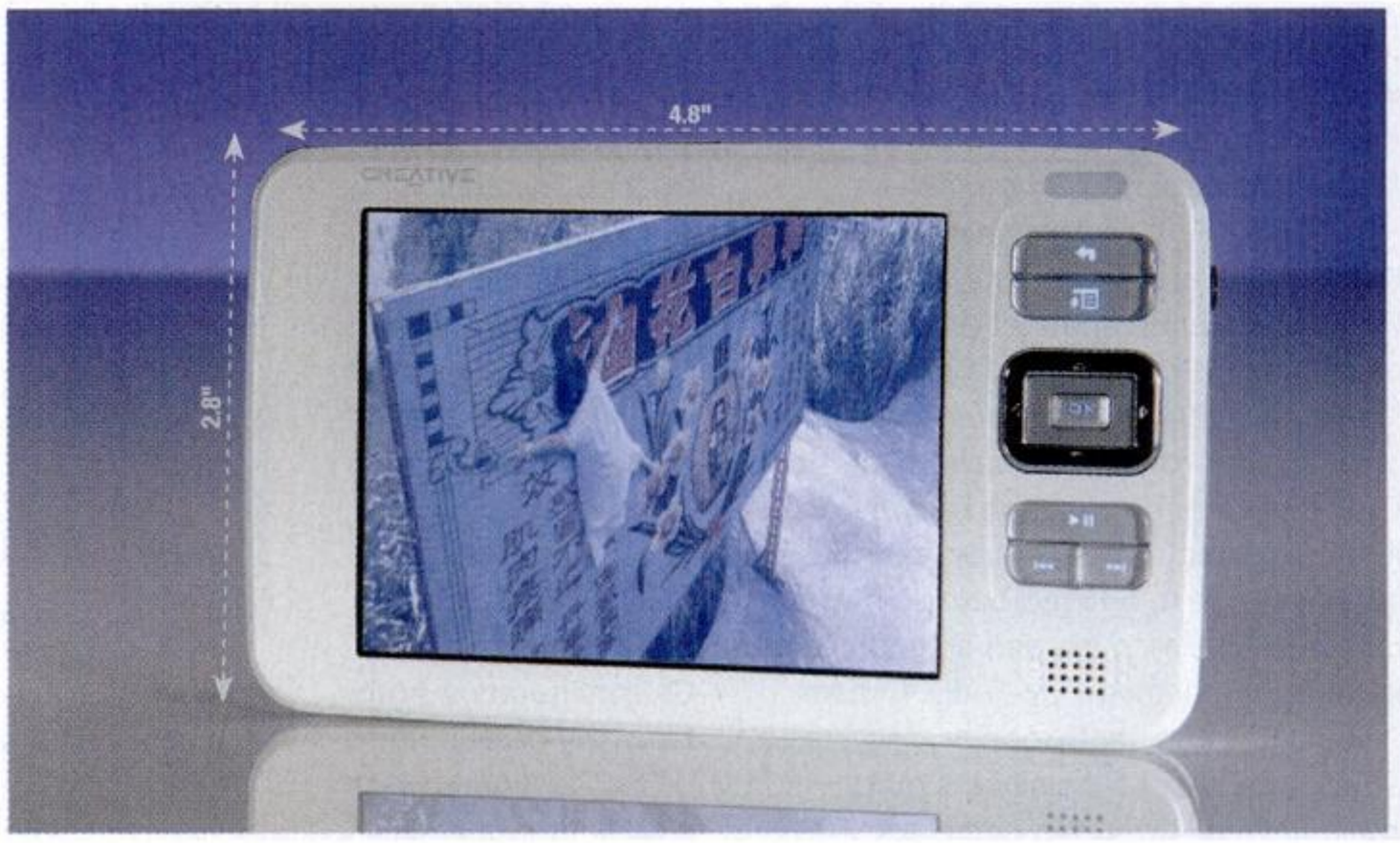
Zen Vision 30GB Portable Video Player

Creative saw the light, and it was pretty good



The screen is sweet, but take our word for it: If you're using the Zen Vision to look at pictures with a friend, make sure you're the one holding the player.

We can only imagine the conversations with Microsoft that took place when Creative decided to ditch Redmond's Portable Media Center platform in favor of its own home-brew interface ("It's not you—it's *us*"). But it was a smart move. The Zen Vision is far superior to its Microsoft-powered predecessor in almost every respect.

Creative is learning how to sex up its products so consumers feel inadequate for not having them. The Zen Vision's aesthetic appeal is seductive—almost slutty, even—with a mellow finish, chrome detail, and a gently rippled surface on the back. It powers up at a flick of the top-mounted slider switch, and the buttons even illuminate for a brief interval after any contact, for nighttime use. The Home menu screen is both attractive *and* utilitarian (not Microsoft's strong suit), presenting all the player options on a single, easily navigable page. Navigation is controlled by a five-way rocker switch on the right-side of the player fascia, which also sports three playback buttons, a return button for backing out of menus, and a button that pops up a contextual menu with options based on the media you're viewing.

The Zen Vision's 3.7-inch screen supports 262,000 colors at a resolution of up to 640x480; that's enough shades to actually attract a bee should you inadvertently leave a picture of a clover blossom on the screen. But, sadly, the screen's ideal viewing angle is extremely limited when viewed in landscape mode—which you'd use to watch a movie. The optimum viewing angle is actually slightly off-axis! Granted, from this angle the video looks fabulous, with rich color and no artifacts, but who wants to watch a whole movie in such a manner? If you turn the player on its side and view it in portrait mode head-on, it looks spectacular and every bit bee-worthy. Clearly, the Zen Vision is using the same screen designed for today's high-resolution PDAs, which are intended to be viewed in portrait mode.

Curiously, the software bundled with the Zen Vision will only convert video to—here we go again—Windows Media Video, and only up to 320x240! What gives? The player is certainly capable of better: We had no problem playing back files of up to DVD resolution (740x480) in Divx and WMV formats (though not Divx 6, which will hopefully gain support in a firmware upgrade). This is a strange quirk, but more eyebrows will likely be raised by the Zen Vision's lack of any video recording ability at all. (Then again, Sony initially dismissed the Walkman, thinking no one would want a cassette player that didn't record!)

As is customary with players from Creative, the sound is *dee-licious*; although audio playback is slightly tilted toward the high end, there's plenty of boom in the bottom. There are a few extras, such as organizer functions, a built-in voice recorder, and FM radio, but none approach the convenience of the integrated CompactFlash slot. While not breathtaking in itself, you can purchase an optional adapter that supports five different formats, including SD cards. You can also purchase a higher-capacity battery, if three hours and 45 minutes of continuous video playback just isn't enough.

Creative Labs did the right thing ditching the Portable Media Center platform to become a little more permissive about the formats it supports. Now we'd like to see the company push the envelope with a wider viewing angle and higher volume ceiling. If we end up buying a competing player from Archos or even Apple, we'll just have to tell Creative—it's not us, it's *you*.

—LOGAN DECKER

SPECS

VIDEO	WMV, MPEG-1, MPEG-2, Divx 4, Divx 5, Xvid
AUDIO	MP3, WMA (including protected WMA), WAV
HARD DRIVE	30GB
DISPLAY	3.7-inch TFT LCD; 640x480; 262,144 colors
EXPANSION	CompactFlash with optional 5-in-1 memory card adapter
BATTERY	Removable Li-Ion

At just the right angle, bubbly Nemo looks his best.

Tilt the screen just a little, however, and you'll have trouble finding him. (Get it?)

ZEN VISION PORTABLE VIDEO PLAYER

DVDs

Beautifully crisp screen, good design, and no stupid video DRM.

BVDs

Extremely narrow viewing angle, no line-in video recording, and mediocre battery life.

8

$400, www.creative.com

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MAGNUM

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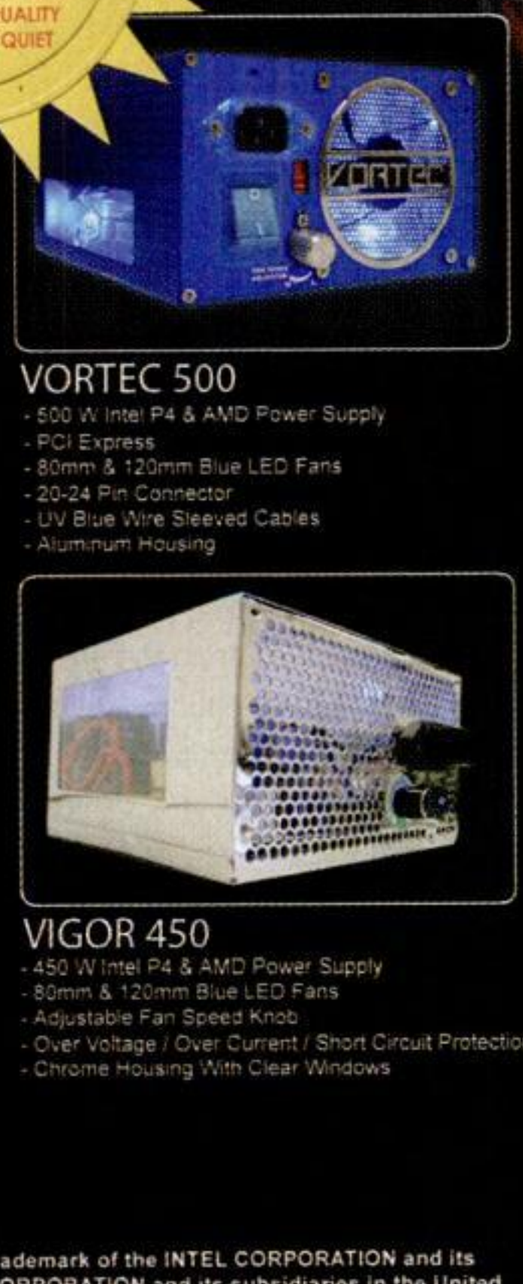
- Smart Fan Control



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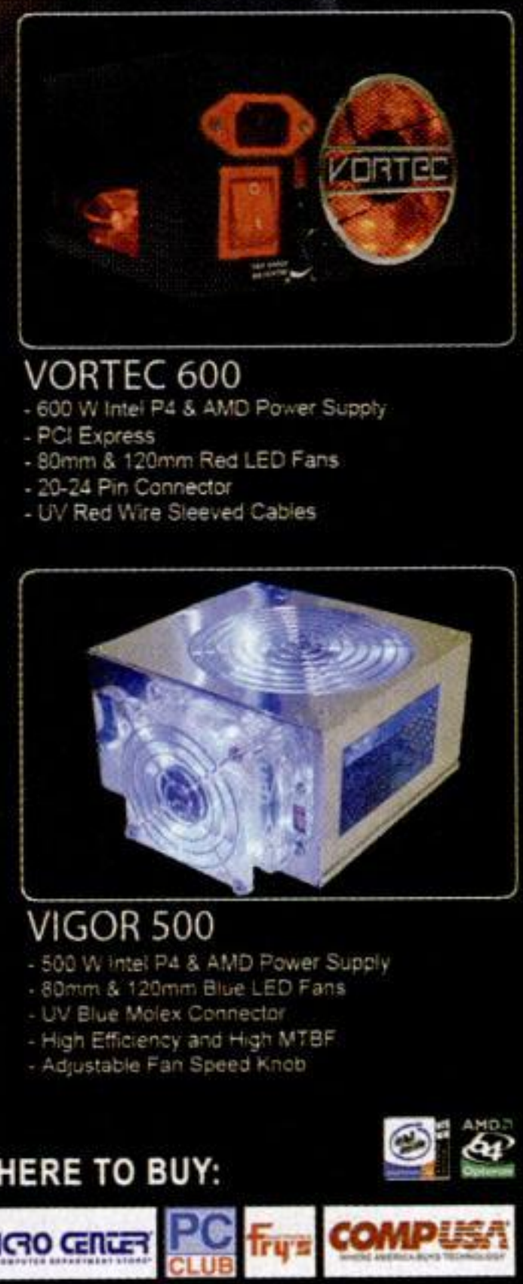
- 20-24 Pin Connector
- UV Blue Wire Sleeved Cables
- Aluminum Housing



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- UV Red Wire Sleeved Cables

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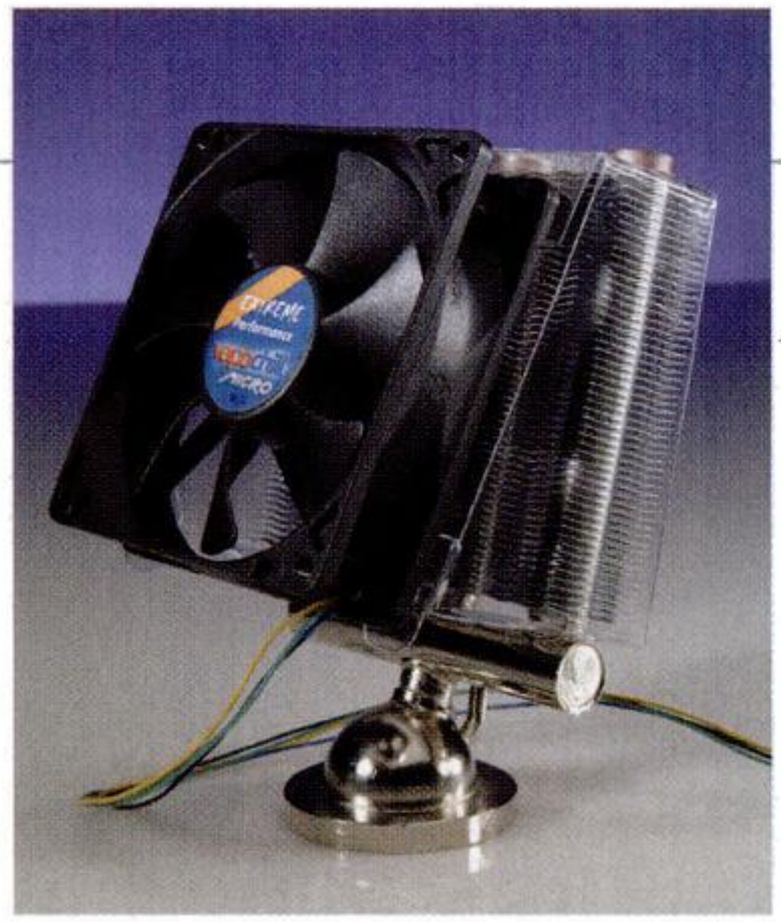
Asetek Vapochill Micro

A triple threat for the CPU cooling crown



The Micro is sold in three configurations: Ultra Quiet, Extreme Performance, and High End. In our tests, the Extreme model (shown) ran very cool, but was "extreme"-ly loud.

Asetek's Vapochill line of CPU-cooling systems has been limited to complicated phase-change water-cooling kits, which require compressors, flux capacitors, and so forth. With the Vapochill Micro, the company has ventured bravely into the air-cooling, um, waters. Though we were initially skeptical, the Micro's compressor-less phase-change performance is every bit as impressive as that of its water-cooling siblings.

The Micro's unique design foregoes the standard base plate and heat pipe in favor of a huge "evaporation chamber" full of liquid refrigerant that sits directly on top of the CPU. The chamber is connected to three fat copper heat pipes that transfer heat to a small array of aluminum fins. The fan bolts to a plastic shroud that snaps on and off of the heatsink with ease, and the shroud's angled orientation allows the fan to cool the CPU as well as the capacitors and MOSFETS around the CPU socket, which is a good thing.

The Micro is available in three different models: Extreme Performance ($45), High-End ($40), and Ultra Quiet ($50). Each model uses the same heatsink, but the fan varies. Motherboard removal is not required to install any of the coolers.

BENCHMARKS

	VAPOCHILL MICRO ULTRA QUIET	VAPOCHILL MICRO EXTREME PERFORMANCE	AMD STOCK COOLER
IDLE (C)	38	**33**	36
LOAD (C)	54	**41**	52

Best temps are bolded. All temperatures were measured via the onboard sensors, using the utilities provided by the motherboard manufacturer. Idle temperatures were measured after 30 minutes of inactivity and full-load temps were achieved running CPU Burn-in for one hour.

We tested the Extreme Performance (super-loud fan, ultimate cooling) and Ultra Quiet models (super quiet at the expense of performance); presumably, the High End model strikes a balance between the two. As the numbers show, performance for both the Extreme and Ultra Quiet models was fantastic. The Extreme model delivered temps lower than any of the water-cooling rigs we've tested, although we'd probably pass on it for our own rigs, given its insanely loud fan. The Ultra Quiet, on the other hand, ran a smidge hotter than the stock cooler, but was gloriously silent. In the end, we were convinced that there's a Micro configuration suitable for any PC setup.

Our only complaints with the product: The plastic shroud that holds the fan is incredibly flimsy, and the base plate that attaches to the CPU socket appears to be made from crappy pot metal. Neither of these pieces show the attention to detail that obviously went into the fabrication and design of the rest of the Micro.

—JOSH NOREM

VAPOCHILL MICRO **9**

$40-50, www.vapochill.com

MAXIMUM PC KICKASS

LaCie SAFE Mobile Hard Drive

A clever drive with a fatal flaw

Once swiped by a sanctioned fingertip, the red LED changes to green and the drive unlocks. You can then put the finger back in its baggie and return it to the beer cooler for future use.

When you're toting around files that cannot fall into enemy hands—be it top-secret aerial photographs or the entire *Girls Gone Wild* collection ripped to Divx—your portable storage must be secure in the event it's lost or stolen. Most portable drives rely on software encryption to protect the drive's contents from ne'er-do-wells, but if you lose the password or lose the drive, your data could be compromised. LaCie's Safe drive is accessed via a fingerprint scan, so you'd have to lose *both* of your hands—it lets you scan a finger from each—to render the drive inoperable.

Setting up accounts and accessing the drive are ridiculously simple. The authentication and new-account wizard run directly from the drive (both Windows and OS X versions are available; but no Linux support), so there's no software to install; a configuration utility that lets the administrator change accounts and assign read/write ability to users, however, does require installation. Only the person designated as the "administrator" of the drive is allowed to add new accounts, and it's a process that takes about 30 seconds and involves selecting two different fingers and scanning them several times. Once your prints are in the database, you plug the Safe drive into a USB port (it's bus-powered, which is good), and then access the authentication utility which resides on the drive. The utility asks you to scan a finger (either of the two you have registered) and the drive unlocks in several seconds. It's a splendidly simple process.

The hard drive inside the elegant outer shell is an 80GB jobbie with an 8MB buffer; it spins at 5,400rpm. Granted, the specs aren't top-shelf, but typically the USB bus limits these drives' performance more than their internal attributes, so a middling rotational speed doesn't bother us much given the drive's huge capacity and bus-powered nature.

The only problem—and it's a big one—is that the data on the drive isn't protected by encryption. If someone who knows a thing or two about hardware hacking were to remove the drive from its case, he could possibly snag the data with a modicum of effort. As a "safe" drive, this is just unacceptable.

—JOSH NOREM

LACIE SAFE DRIVE **6**

$200, www.lacie.com

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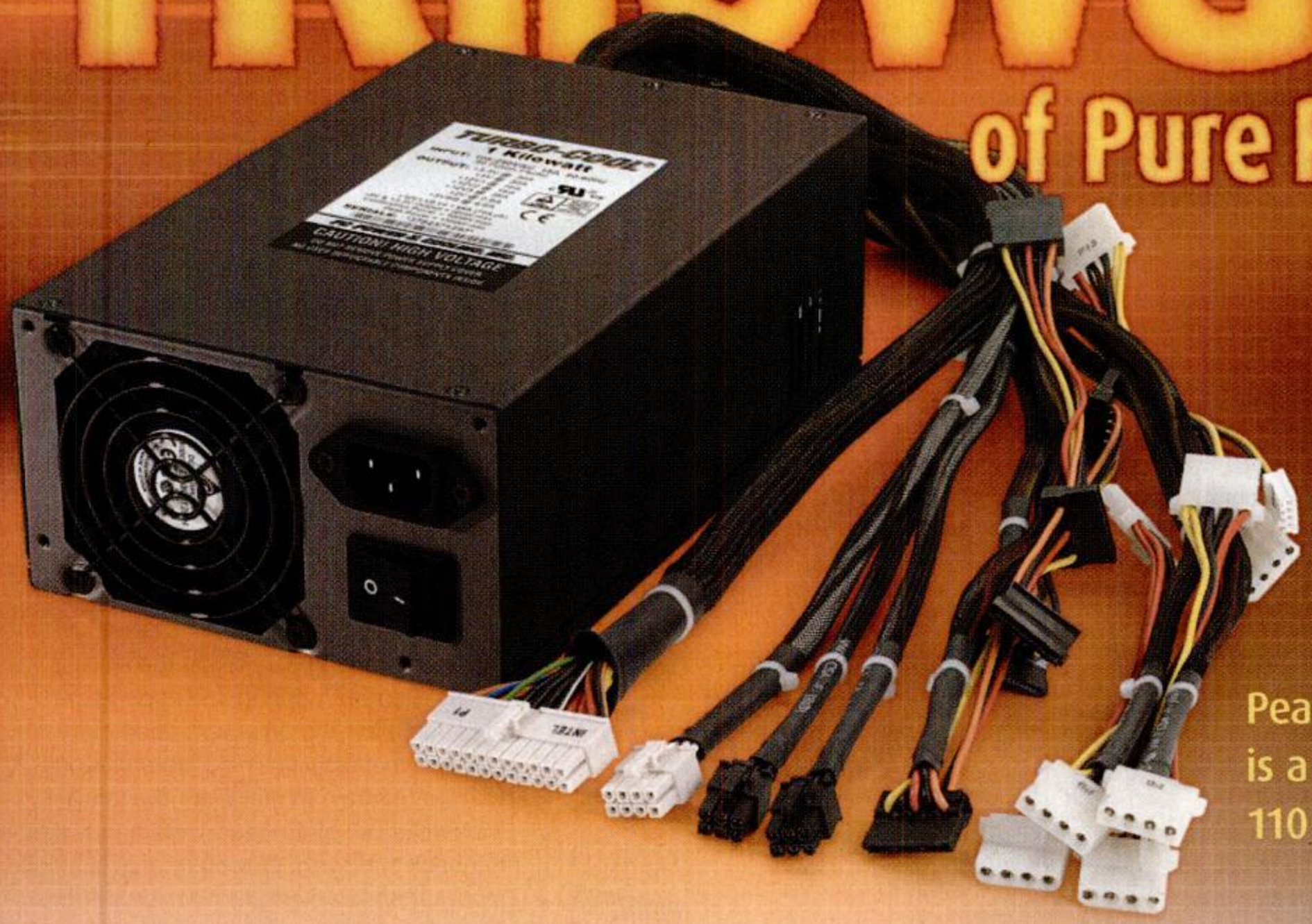

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Foolin' with Hard Drive Coolin'

Two enclosures attempt to tame a wily DiamondMax 10

In a typical PC, your hard drive resides inside a bay with a fan mounted in front. Cool air passes over the drive and keeps it chilly. This setup works just fine for most people. But we're not most people. We want our drives to be quieter, and we don't want loud fans spinning just to keep them cool. That's where a drive enclosure comes in: It reduces vibration transmitted from the drive to the case (dampening associated noise in the process) by securing the drive with rubber gaskets and cooling it with a small enclosed fan. The purpose is to keep your drive cool and quiet, and we're happy to report that the two drive enclosures we examined this month fulfill that promise in spades.

—JOSH NOREM

The CoolDrive Lite is a simpler version of the CoolDrive, sans temperature and fan speed sensors.

SILVERSTONE FP53

We've long lusted over Silverstone's statuesque cases, but this is the first time we've tested one of the company's hard drive enclosures. We had high expectations, and we were not let down.

The FP53 sports a simple design: an all-aluminum outer body, a small, 4cm internal fan, and a thermal pad that transfers heat from the drive to the outer shell, which doubles as a heatsink. The internal fan spins at 5,000rpm, but it's so small that it's practically inaudible. Silverstone claims the fan puts out 25dBA, which seems plausible—it was perfectly quiet to our ears.

The FP53 did a fantastic job cooling our DiamondMax 10 test drive, which became only 1 C hotter than it was when the test case's 12cm intake fan was blowing on it. The drive's operating temperature of 28.7 C inside the FP53 was 16 C cooler than with no cooling at all. That's impressive, especially considering the drive was significantly quieter inside the FP53 enclosure than it was hard-mounted in our Silverstone TJ03 test case.

Color us impressed. The FP53 did everything it was supposed to do and it performed beautifully. Given its low price, you should drop what you're doing right now and buy one.

SILVERSTONE FP53

DRIVE BAY
Cool, quiet, sexy, easy to install, and affordable.

MICHAEL BAY
Doesn't cool a drive as much as a noisy case fan.

9

MAXIMUM PC KICKASS

$30, www.silverstonetek.com

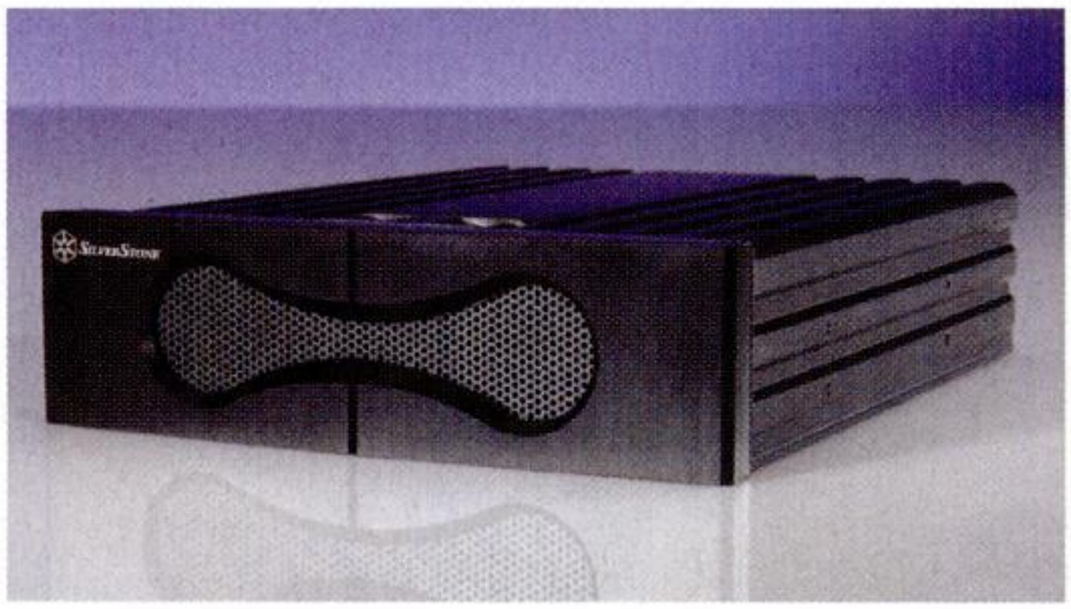
COOLER MASTER COOLDRIVE LITE

Cooler Master's take on the aluminum heatsink/fan drive bay is similar to Silverstone's (this isn't rocket science, after all), but CM goes one step further by including two thermal pads—one for each side of the drive. The CoolDrive Lite also uses a slightly larger fan—4.4cm versus Silverstone's 4cm—which spins at a relatively slow 3,000rpm. Cooler Master says the fan puts out 23dBA, which is 2dBA less than the Silverstone unit, but it's a moot point because both enclosures were exceptionally quiet to our ears during testing.

Still, although our test drive was quieter in the Cooler Master enclosure than it was hard-mounted inside the case, it was slightly more audible than when it was in the Silverstone FP53. At idle the drive is totally silent, but during seek operations we could hear the drive operating quite clearly, whereas with the Silverstone unit we had to strain to make out the familiar "tick,tick,tick" of the read/write heads flicking back and forth. Obviously, this is a subjective measurement, as no microphones or decibel meters were used, but to our own ears the drive was a smidge louder in the CoolDrive. Both enclosures made the drive more quiet than when it was hard-mounted inside the case, however.

The temps from the CoolDrive were less than 1 C higher than those of the Silverstone unit, so we consider this category a wash. The drive remained sufficiently cool at all times. For comparison, the test drive was less than 2 C warmer in the CoolDrive than it was with a 12cm case fan blowing on it, which is amazing considering how small the fan on this thing is.

The CoolDrive is impressive—but it's just a bit less impressive than Silverstone's FP53.



The FP53 has that distinctive Silverstone look. The enclosure's 4cm fan is mounted just behind the mesh grill.

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TEEN T CONTENT RATED BY ESRB
Crude Humor
Mild Language
Simulated Gambling

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Dungeon Siege II

A top-notch action RPG that doesn't play itself!

The original *Dungeon Siege* was essentially a *Diablo 2* clone with a few handy special features and a more interesting character development scheme. But it was poorly balanced—a killer flaw. You, the player, really didn't need to do much in order to succeed. Your primary concern was to move your characters down the path and mash the health or mana potion button occasionally. The little guys would automatically handle all the actual fighting.

The follow-up title fixes that glaring weakness by making the game significantly more difficult. First, instead of finding enemies in clumps of one or two, you'll find them grouped in the dozens, around a boss monster or two (or three). The boss monsters are stronger and have more health than the other monsters, so you'll need to make decisions at each battle—do you kill the weak enemies first, or the big baddie? Indeed, you'll need to make split-second decisions in every battle or your party *will* be wiped out.

Gas Powered also limits the size of your party to increase the difficulty. In the original, your party could have up to eight characters. But you rarely needed them. Character development options were so limited in the first game that there were only four basic types of character you could play. Ironically, in *DS II* you can create a wider variety of toons, but you're limited to only four characters at normal difficulty (at the unlockable higher-difficulty settings you can have five or six party members). This limitation means the choices you make as your characters develop are more significant.

This time, you'll need to use all your special abilities if you want to survive. *Dungeon Siege II* is much harder than the original.

In the original *Dungeon Siege,* character advancement was determined by the skills you used. At the lowest levels, all characters have access to the four basic skill trees—melee combat, ranged combat, nature magic, and combat magic. In *DS II* you also receive points every time you level that you can apply to different specialties. With these points, you can either slightly improve all aspects of your character, or you can hone and supercharge a specific aspect of your character. You need to develop your characters to fill fairly standard roles in the game—you'll need a tank, a healer, and some damage dealers. Without the tank and the healer, you'll have difficulty taking down large groups of enemies. Unfortunately, the limit on party size prevents you from really exploring some of the more interesting areas of the melee and nature magic trees.

The spell effects in *Dungeon Siege II* are absolutely breathtaking—the ground ripples as your powerful strikes disintegrate your opponents.

Also new in *DS II* are pets. Instead of simply buying a pack mule to haul around your excess gear, you'll need to take time in this game to raise your pet, from baby to a fully grown adult. You'll advance through the pet's lifecycle by feeding it extra items and potions. The more powerful the items you feed it, the more powerful your pet will become. As your pet grows, it will gain more skills and special attacks it can use to aid your party. There are a ton of pets in the game, ranging from elementals to tamed beasts, each with its own strengths and weaknesses.

You'll fight thousands of strange and polygonal characters as you explore the jungles and dungeons of Aranna.

Despite its flaws, we really liked the original *Dungeon Siege,* and the sequel doesn't disappoint. The single-player campaign is perfectly balanced, delivering enough difficulty that we weren't bored, without ever getting frustrating.

—WILL SMITH

DUNGEON SIEGE II

MAGIC
Great single-player campaign, lots of character development options.

TECHNOLOGY
No VOIP in multiplayer, small party-size limit, no stand-alone multiplayer.

9

$50, www.dungeonsiege.com, ESRB: M

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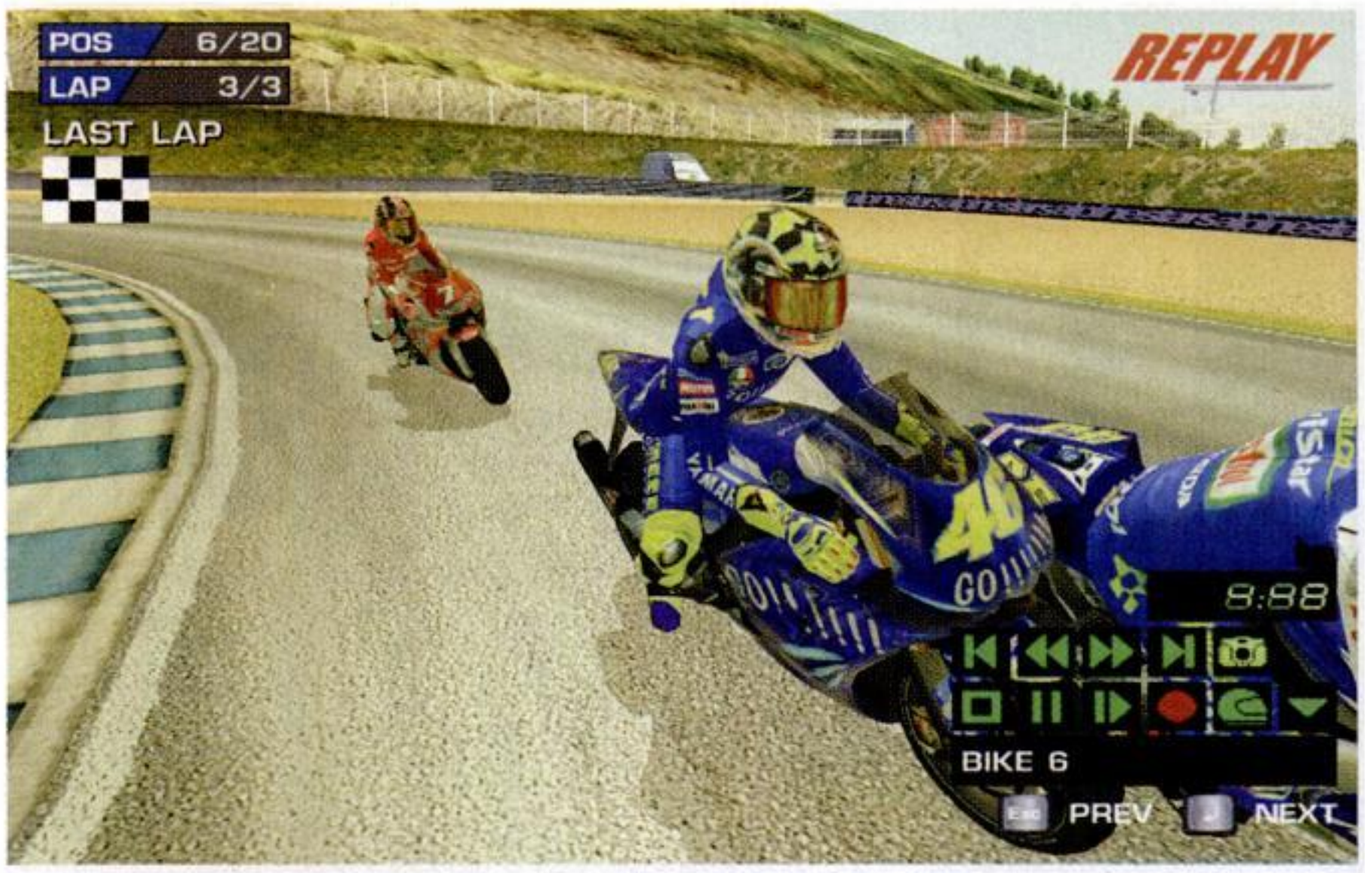
MotoGP 3

Killer knee-down action on both street and track



You can view replays of any bike's performance, so you're not limited to footage of yourself repeatedly riding into the kitty litter.

For those not in the know, MotoGP is the highest level of motorcycle racing in the world. It's akin to F1 for cars, in that it's run with nothing but hand-made, multimillion-dollar prototype machines that are driven by the top racing talent. In *MotoGP 3*, you get to pretend you're part of the MotoGP circus, and if all that fancy bike racing isn't your thing, the game also includes Isle of Man-style street racing, making it two games in one.

The MotoGP part of the game can be approached in several ways. There's always the Quick Race option if you're looking for some racing action without all the hassles a race weekend entails. There are time trials as well, if you just want to ride the tracks without any pressure. The meat of the MotoGP experience, however, is the career track, where you start the season on one of the crappier bikes (Yamaha M1, Harris, or Proton), and as you finish in better positions you unlock faster, more lustworthy bikes and riders, including the world-conquering Honda RC211V and multi-time world champion Valentino Rossi.

With the completion of every race you get "ability points" you can add to your bike, making it turn better, stop faster, and so forth. You also get money you can use to upgrade your bike with a better fuel-injection map, higher-lift cams, and the like. The street-racing portion of the game functions similarly, and is actually—in our opinion—more fun than the MotoGP segment, because the bikes are smaller and easier to handle, and the courses more interesting.

You must have a gamepad to play *MotoGP 3*—don't even bother with a keyboard and mouse because the bikes are too hard to control. Also don't bother listening to the soundtrack—it's mixed terribly and the songs are annoying. The graphics are superb, however.

While we think it's bunk that three-quarters of the game is "locked" and inaccessible in the early stages of the game, there's still a lot of racing fun to be had.

—JOSH NOREM

MOTOGP 3 **9**

$40, www.thq.com,
ESRB: E

Indigo Prophecy

Lights! Camera! Traction!

Lucas Kane appears to have a severe impulse-control problem.

Shot in the face. Drowned in icy water. Bounced off the hood of a car. Charged with murder and thrown in jail for the rest of your sorry life. That's just a sampling of the catalog of misfortunes that assail you in *Indigo Prophecy,* an adventure game that slyly skirts every stale convention that's held back the genre for years.

While under the influence of a sinister remote force, Lucas Kane murders a complete stranger in the bathroom of a New York diner. He becomes your first playable character, and unless you think the cop just outside the door is going to be sympathetic to your story, you better act fast. Choosing to scram out the back door, however, will certainly raise a few eyebrows among witnesses, while trying to clean up the evidence of your misdeed takes precious time. Dilemmas like this that require snap decisions will haunt you throughout the entire game. Even dialog becomes a nerve-wracking experience when you're given only a second or two to choose a topic which may or may not be the one that helps you navigate closer toward the story's apocalyptic conclusion.

Indigo Prophecy passes on traditional puzzle-solving in favor of action sequences that require you to hammer keys (or buttons on your gamepad) that correspond to colors on the screen. It sounds silly, but it injects a tremendous amount of adrenaline into a genre that rarely delivers this kind of experience. When the game goes into split-screen mode it's especially thrilling, as you can see a threat coming down the hallway in one screen while you're scrambling around looking for cover in the other screen.

Even with the graphics throttled to max, *Indigo Prophecy's* drab textures and chunky environments won't give your videocard a workout. And while the game's branching nature suggests multiple paths to multiple narratives, your decisions actually have very little influence on the story, which is disappointing. Nonetheless, *Indigo Prophecy* comes closer to being an interactive movie than any other game in recent memory.

—LOGAN DECKER

INDIGO PROPHECY **8**

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ESRB: M

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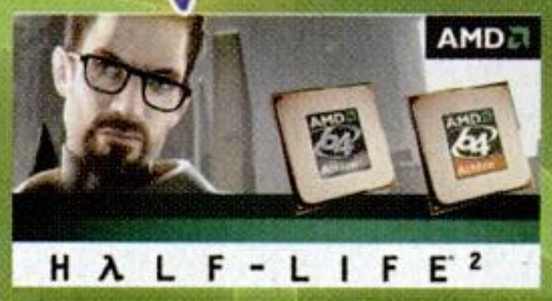

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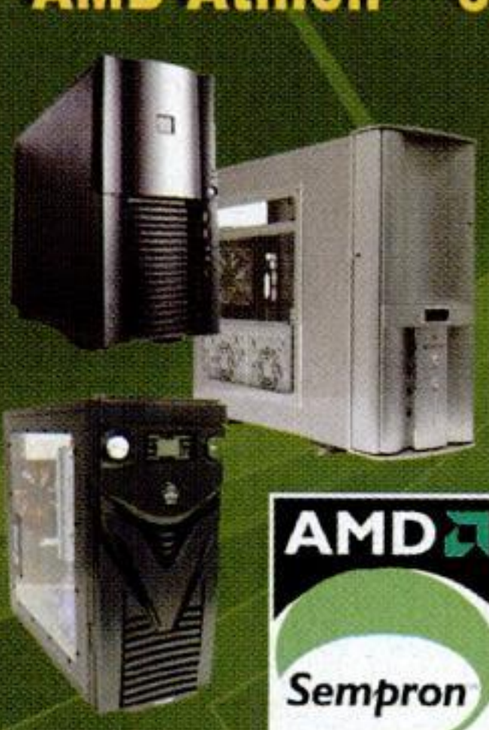

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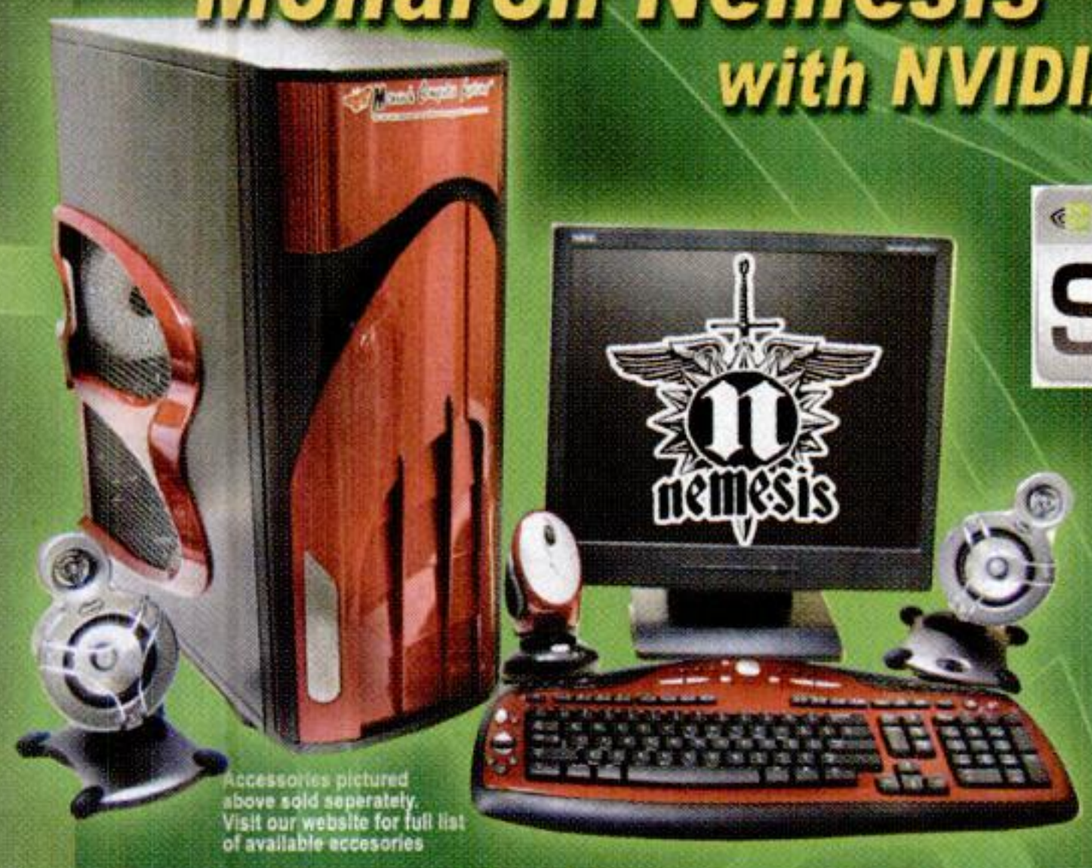

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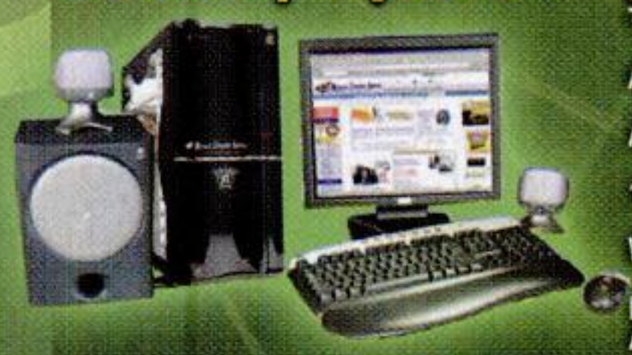

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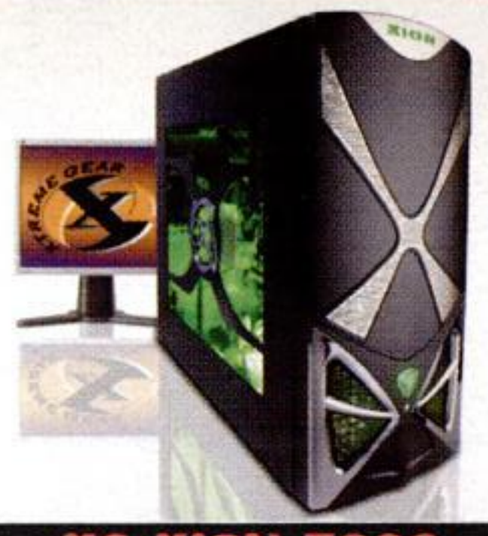

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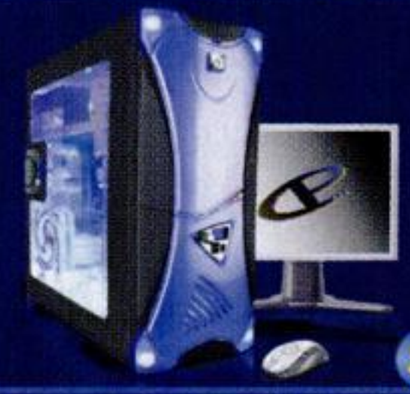

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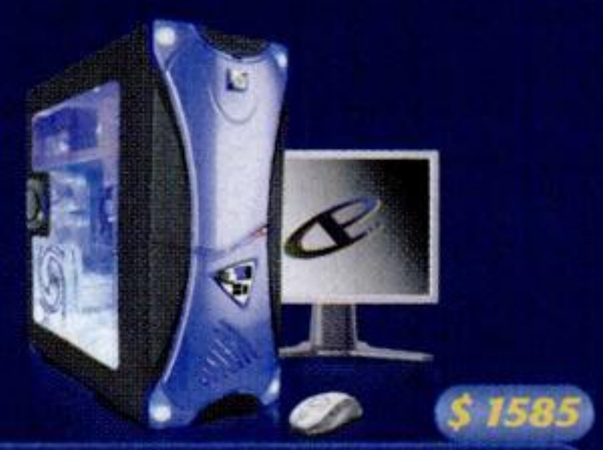

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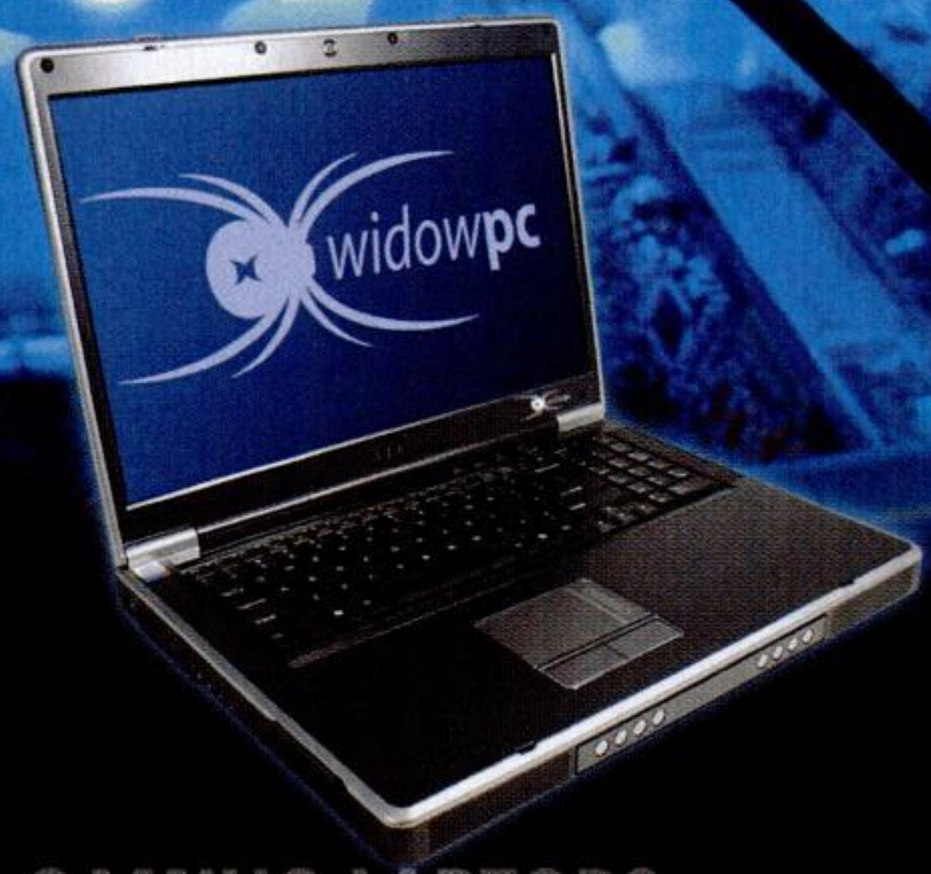

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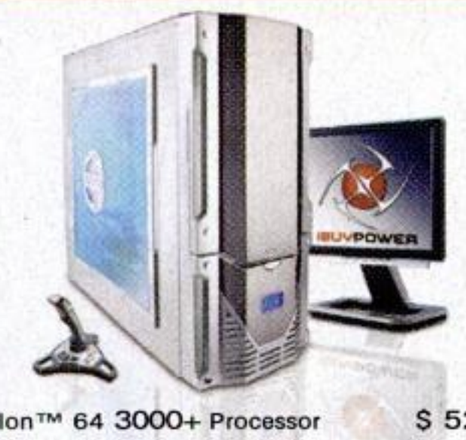

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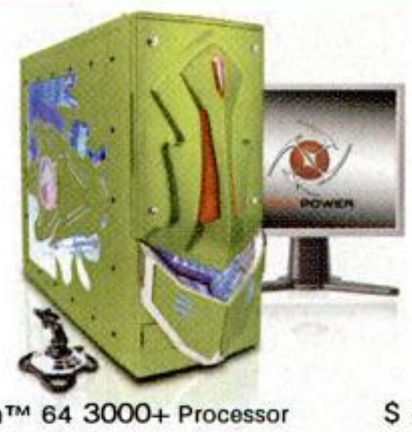

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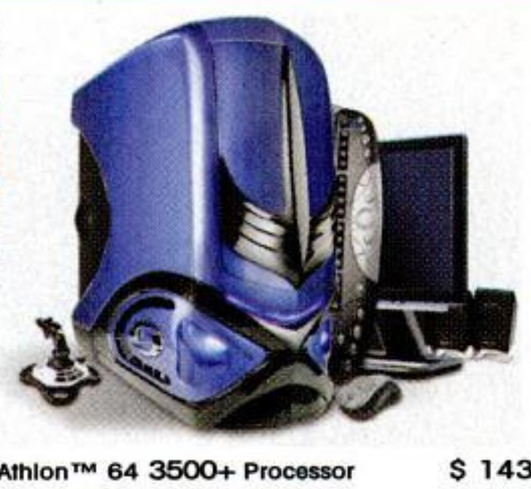

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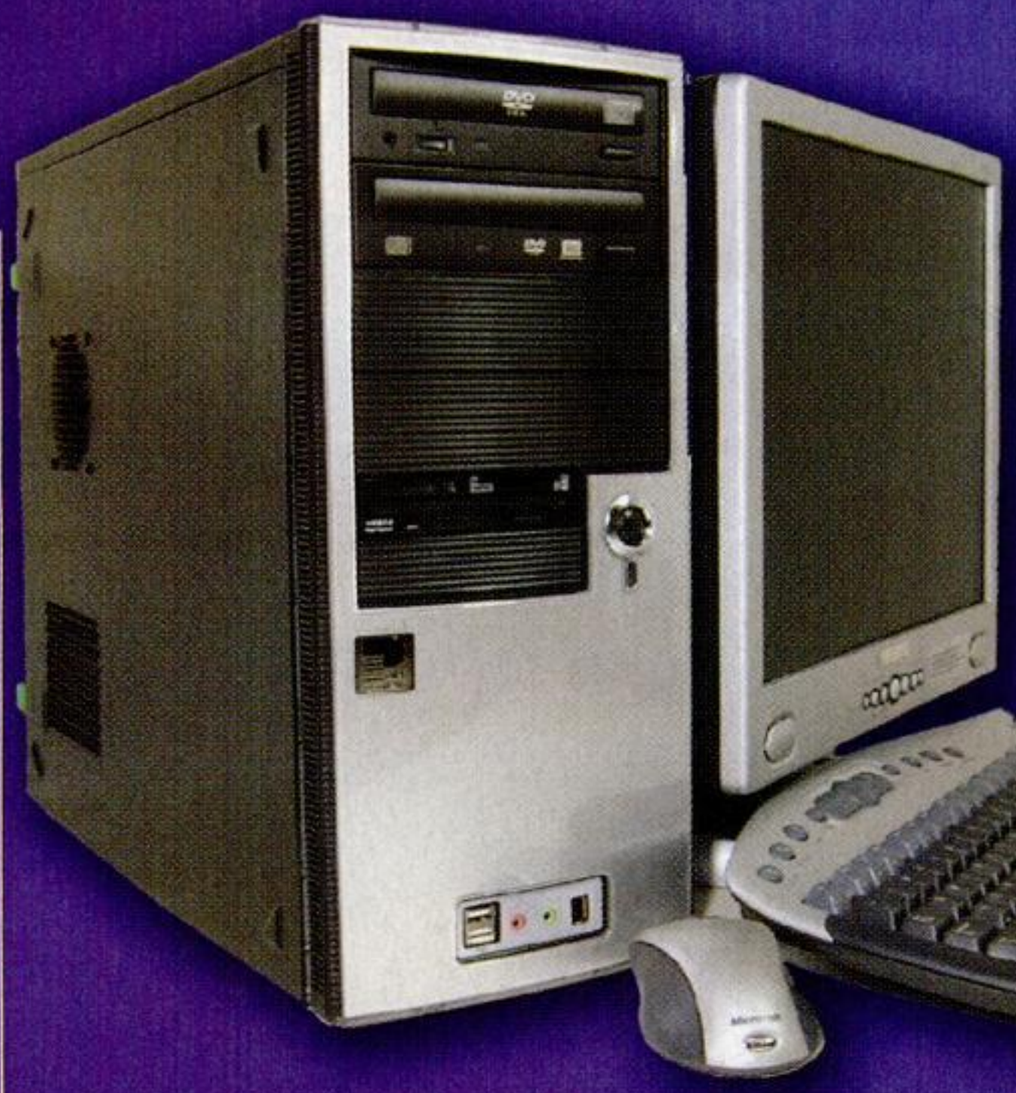

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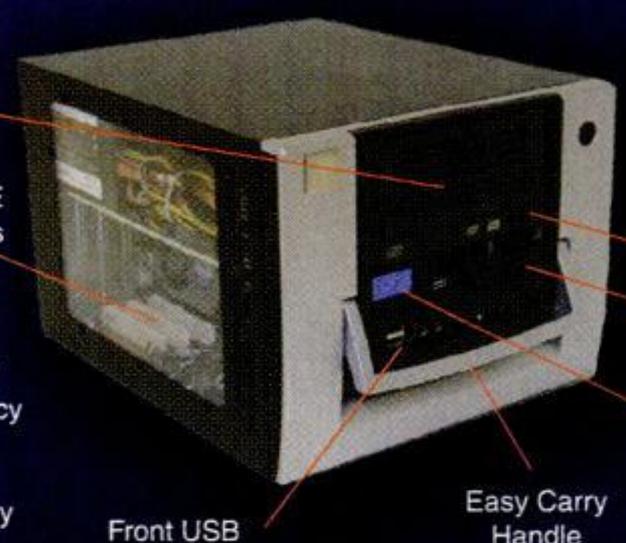
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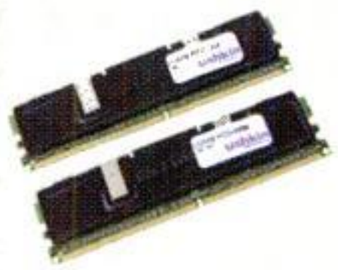

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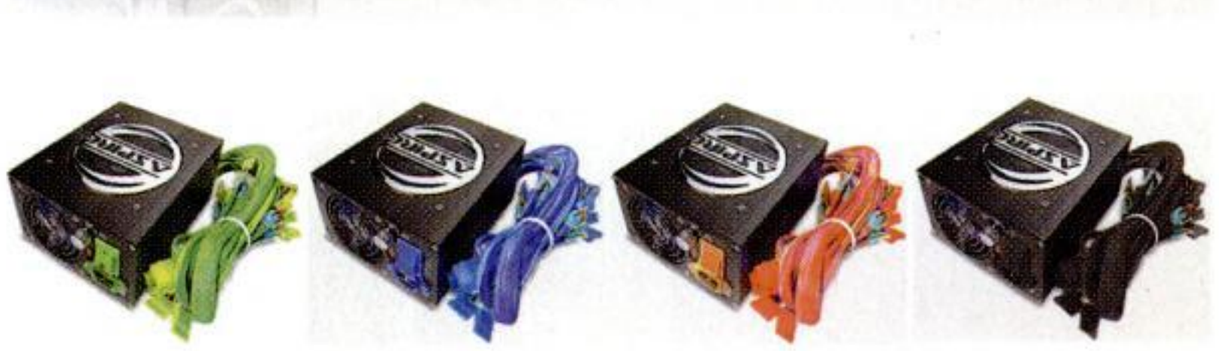

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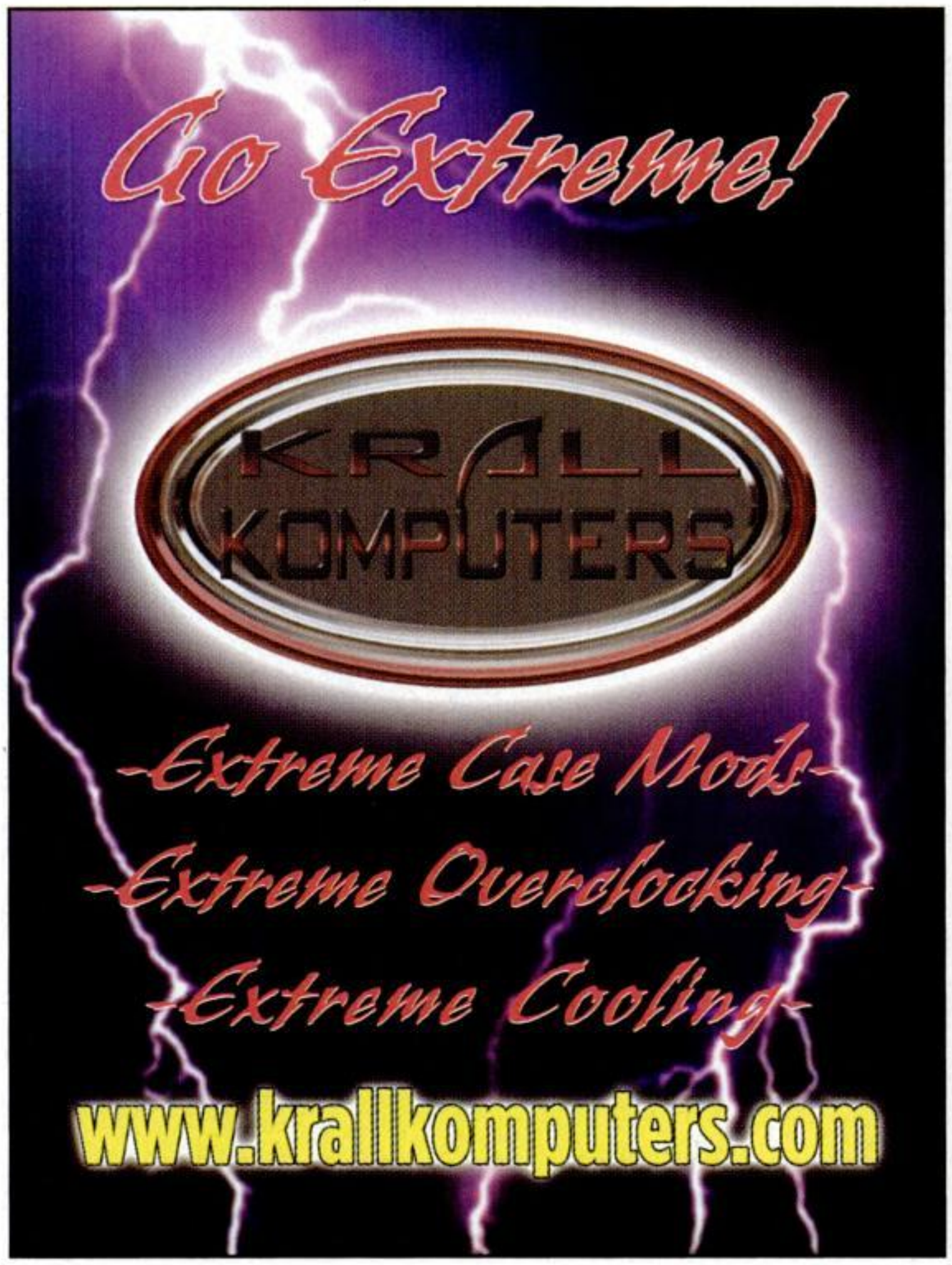

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We tackle tough reader letters on...

✓Zalman Cooler ✓Dream Machine Pricing ✓64-Bit Windows ✓RAM Drives

THE NEMESIS IS TOO EXPENSIVE?!

*I found one thing in the September issue that just doesn't make sense. The Dream Machine costs $12,870 yet gets spanked in every benchmark except **SYSmark2004** by the Monarch Nemesis (reviewed in the same issue). Yet you call the Nemesis (priced at $4,325) extremely expensive? By the time software catches up with the hardware in the Dream Machine, there will be much better hardware available at a lower cost.*

—Jim Kellerman

SENIOR EDITOR GORDON MAH UNG RESPONDS: I think it's pretty clear we were smitten with the Monarch Nemesis, which received a 9 verdict and a Kick Ass award. You're missing the point of the 2005 Dream Machine exercise: multi-core processors vs. single-core. If you take a single-core machine and a multi-core machine and run tests on them, the single-core box will probably be faster. Put them both on ice for three years and then run benchmarks with 2008 applications, you'll likely find that the single-core box is exactly the same speed, while the multi-core box is far faster because developers have caught up with the technology.

And, yes, we think the Nemesis is extremely expensive. While it's true that the Dream Machine was even more expensive, anything less would hardly be considered a dream, would it?

DIFFERENT STROKES FOR DIFFERENT FOLKS

*The name of the magazine is **Maximum PC**. I expect the winners of any cooling test to be the ones that do their job most **efficiently** or **effectively**. None of this namby-pamby whining of, "Oh, it's too big, and it's too loud, and my touch-typing fingers aren't strong enough to install it." Repeat after me... **Maximum PC**... I work for **Maximum PC**....*

—J. Wrenchski

ASSOCIATE EDITOR JOSH NOREM RESPONDS: The motherboard and CPU are the heart and soul of any modern PC, and a lot of people feel very uncomfortable about monkeying with a contraption that might destroy both of these cherished items. As such, ease of installation is an extremely important consideration when evaluating a CPU cooler, especially as a lot of the universal coolers require motherboard removal for installation. You haven't felt true pain until you've removed your mobo from your case, taken off the stock cooler and then struggled to comprehend the asinine instructions required to mount the cooler and make your PC whole again. Plus, several of the coolers we reviewed either blocked RAM slots, blocked other components on the mainboard, or simply couldn't be mounted at all. That's not "maximum," that's rubbish, and we gave verdicts reflecting every aspect of a CPU cooler's experience.

CAN I USE 64-BIT WINDOWS?

Can the 64-bit version of Windows XP play all the games I own, and all my other software for that matter? I need to know because I'm building a computer for my kids and was going to put my current copy of XP on that machine, and I don't want to buy another copy of the same thing. I want to upgrade my game machine to 64-bit Windows.

—Jeff Garner

SENIOR EDITOR GORDON MAH UNG RESPONDS: You can run more software on Windows XP x64 Edition than you might expect, but I think the OS is still best used as part of a dual-boot setup. If you want to buy a different Microsoft OS with the same compatibility as XP Pro/Home, you might try Media Center Edition.

WE WANT MORE RAM DRIVES!

*Back in the January 2003 issue of **Maximum PC**,*

Where's Zalman?

I'm writing in regards to your CPU heatsink showdown (September 2005). It's always nice to see an objective review of a product type that the buyer typically has to learn about from the manufacturers' websites. But I feel as though you left out one brand. Zalman products have a reputation for fantastic cooling, so my question is, whither Zalman?

—Jesse Martin-Alexander

ASSOCIATE EDITOR JOSH NOREM RESPONDS: We've received a lot of email about Zalman's absence from our roundup, and we were as surprised as anyone that the company didn't participate. Unfortunately, Zalman couldn't get us new product in time for our deadline, despite repeated emails and reminders.

The good news is that we have the new CNPS9500 LED CPU cooler in hand, as well as the updated Resorator 1 Plus passive water-cooling kit. We couldn't squeeze them into this months issue, but look for the full reviews of both products in next month's issue.

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you reviewed the Cenatek Rocket Drive. I have always wondered why this pricey piece of hardware has never graced a Dream Machine setup to host the pagefile.sys. Would you consider testing this to see if there's a noticeable enough performance gain (and what types of applications benefit most) for the extreme PC enthusiast with nothing better to do with $3,000?

—Adam Morris

SENIOR EDITOR GORDON MAH UNG RESPONDS: The primary reason we've never used a solid-state drive in the Dream Machine is that we haven't found one large enough or with enough features to make us sacrifice an expansion slot. The Rocket Drive is fast but it lacks a battery backup. We've also done enough game-loading tests from RAM drives to know that with today's games, the CPU is the bottleneck, not the hard drive, because of all the compressed textures, sounds, and maps being used.

MEASURING NOISE IN THE LAB

In the September issue you reviewed 10 CPU heatsink/fan units. You measured the decibel output of each, and the measurements you reported were grouped in the 60+dBA range. In the same issue, in the How2 section, you tout the Gigabyte G-Power CPU cooler, and state that it produces 21dBA, yet in the CPU cooling feature you rate that same cooler at 66/63dBA. Which is it? On Gigabyte's website the G-Power is rated at 21.3–40.1dBA. This tells me that the manufacturer's methods are radically different than your Lab tests. What gives?

—Matthew

ASSOCIATE EDITOR JOSH NOREM RESPONDS: Measuring sound output from an individual component immersed in a sea of silicon is very difficult, and we knew that going in. Still, we decided to try to make it a "real-world" measurement of sound output, so we built an enormous box full of foam, went to the quietest room in the building, laid the mobo and fan inside the box, connected our PSU through a tiny hole we cut in the side, and pointed the decibel meter at the CPU cooler from 24-inches away. This is the number we report in our noise tests.

The dBA measurement provided by a fan's manufacturer is the noise a fan puts out all by itself. The manufacturers aren't lying in their assessments of a fan's noise output, we're just measuring noise in different ways. As a general rule, we found that the fans whose manufacturer's noise rating was above 40 decibels were comparatively loud, while anything under 30 seemed quiet to our ears.

STOP YOUR WHINING

I find the editor's letter in the October 2005 issue hypocritcal. You gave Windows XP a 10 verdict when you reviewed it, and now you think it's crap. You're looking forward to Vista, but you want the old version fixed. What the hell would Microsoft get out of spending money to fix XP when the company is going to "upgrade" everyone soon?

So while you're using XP to view my email, do us all a favor and get yourself a Mac or something so you can stop whining.

—Alex Passmore

EDITOR IN CHIEF WILL SMITH RESPONDS: I've gotten more email about my October editorial than any other in the last five months, and the issue has been on newsstands for just a week.

The fact is, I spent a little more than eight months exclusively using Linux last year (see "Making the Linux Switch," February 2005). And I've used a Mac for the last seven months for a similar forthcoming article. So I'm familiar with the alternatives to Windows, and I know exactly what problems are inherent to the various OSes.

At launch, Windows XP was the best version of Windows ever; there was no way I could have looked ahead four years and seen the terrible consequences of a few seemingly trivial bone-headed decisions (the inability for normal users to use their machine as anything but an admin, for instance; or the fact that XP shipped with its rudimentary firewall disabled by default; or the infection vector that is ActiveX). Sure, you and I have no problem, because we know not to install WeatherBug and not to click email attachments, but don't tell me your mom's computer isn't loaded with malware. The problems plaguing Windows would be reasonably easy to fix—Microsoft just has to commit to make the fixes.

Will I upgrade to Vista if Microsoft doesn't fix XP? Probably not. If Microsoft is serious about selling people Vista (not to mention the hardware upgrades they'll need to get the OS to run), the company needs to make current disgruntled Windows users happier. MPC

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COMING NEXT MONTH IN MAXIMUM PC'S IT-TAKES-A-VILLAGE-IDIOT HOLIDAY ISSUE

UPGRADING A-TO-Z

How strong is *your* upgrading fu? Newbs rightly feel a sense of trepidation installing a $600 prize videocard, but even power users would be wise to refresh themselves on the basics of choosing, buying, and installing upgrades for their rigs. With big, colorful pictures and a minimum of three-syllable words, *Maximum PC* goes from component to component showing you which upgrades matter the most.

THE MAXIMUM PC GIFT GUIDE

We're geek on the outside, and if you cut us in half, you'd see geek on the inside, too. So you can trust our judgment when it comes to finding the best gifts of the year for the geek in your life.* From the Magic 8-Ball of the 21st century to the DIY robot beer waitress, we've got fun stuff for every budget. Operators are standing by!

*** Or for yourself—it's none of our beeswax.**

GET ON OUR CASE!

We're beating the crap out of a new truckload of new PC cases, including Cooler Master's latest flagship enclosure, the CM Stacker. Check in next month for the verdicts!

PLUS...

Reviewed... Western Digital's 400GB Caviar drive and the second rev of Zalman's legendary Resorator!

RASMUS CHRISTENSEN'S

Humvee PC

We could do without ever seeing another Hummer muscling its way through commute traffic or crammed into a sub-compact parking space, but if it's hand-built to perfect miniature proportions (from about 20 kinds of wood and "lots of bathroom and garden items"), and stuffed to its tiny TOW missile launcher with computer parts, we're unabashed fans.

Rasmus Christensen spent some 500 hours over six months painstakingly recreating every aspect of the real-life vehicle. Amazingly he gleaned *all* the specs and measurements from pictures he found on the Internet—having never himself seen a Humvee first-hand in his home country of Denmark.

"I wanted this case mod to be used like a normal computer, with access to CD/DVD/floppy, fanbus, USB, power/reset, etc. in the front, and all the cables coming out the back," says Christensen, who skillfully achieved that goal.

Fully loaded, the Humvee PC weighs 53 pounds. It spans 31.5 inches from headlight to taillight, and is just about 16 inches wide.

Christensen designed a 12/7-volt fanbus to control the multitude of fans within the case. By running the fans at the lower voltage, they never exceed 17 decibels, making the machine "almost totally noiseless," he says.

An Asetek Waterchill cooling kit sporting dual 8.8cm radiators is the other half of the rig's cooling equation.

SPECS

CPU	AMD XP2400+
MOBO	Soltek KT800
RAM	1GB Kingston dual-channel
Storage	2 Seagate hard drives (80- and 120GB)
Graphics	HIS 9800Pro
PSU	Chill Innovations 510W

If you have a contender for Rig of the Month, e-mail **rig@maximumpc.com** with high-res digital pics and a 300-word write-up.

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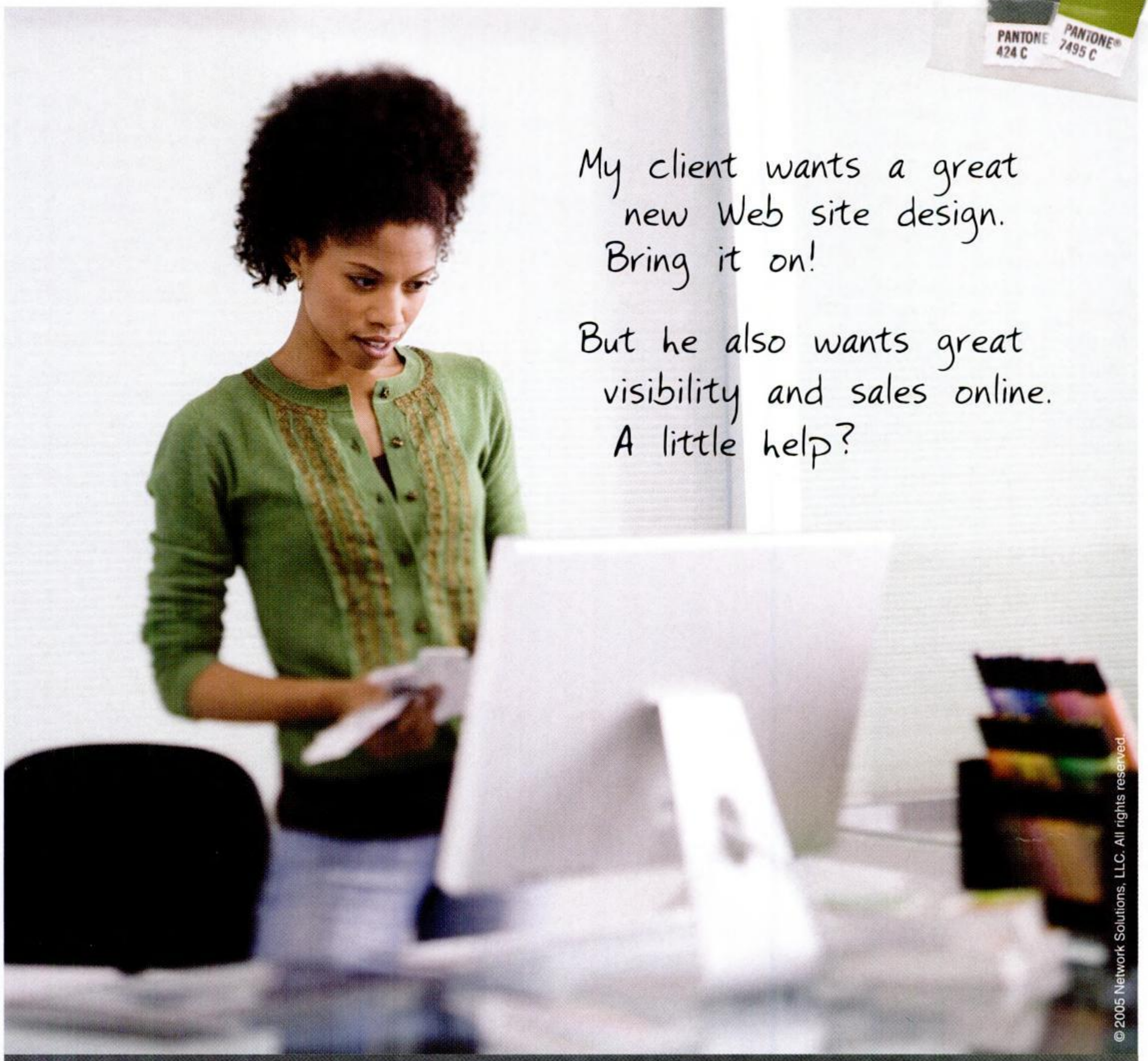
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